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CONTROL OF NEW-ZEALAND-FLAX GRUBS.

INVESTIGATIONS INTO PARASITES.

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IN an article on the investigation into the control of the New-Zealand-flax grubs (*Xanthorhoe praefectata* and *Melanchra steropastis*) published in the June, 1917, *Journal*, mention was made of a natural enemy infesting the former species in the Riverton district. On looking carefully into this important matter it has been found that a similar parasite infests the larvæ of *X. praefectata* in the greater part of those flax (*Phormium tenax*) areas extending south of the Manawatu River between Shannon and Foxton to Waikanae. This parasite (Fig. 1) is a small ichneumon wasp, which apparently deposits its eggs in the young flax-grubs. Up to the present no larvæ of *X. praefectata* from the badly attacked flax of the Makerua Swamp (*i.e.*, north of the Shannon–Foxton line) have been found parasitized by this species, but fully 30 per cent. of the larvæ captured in the swamps south of the Shannon–Foxton line have been found to be infested, and here the flax is comparatively free from the attacks of larvæ.

At the present stage of the investigation the data show that the mature parasites emerge simultaneously with the hatching of the first spring brood of larvæ of *X. praefectata*, so that the latter (Fig. 2) are open to the attack of the parasite. None of the grubs parasitized by this small species of ichneumon wasp and kept under observation reached beyond medium growth, since at this stage the parasite pupates within its victim, the cuticle of which is utilized as a covering, so that the parasite pupa assumes the shape and occupies the whole length of the flax-grub except for the head and first thoracic and anal segments (Fig. 3). On the formation of the parasite pupa within the flax-grub a glutinous substance is exuded from the anterior end of the latter, gluing the dead grub to the support, which is usually the inside of

FIG. 1. SMALL ICHNEUMON WASP PARASITIC ON XANTHORHOE PRAEFECTATA GRUBS. × 7.

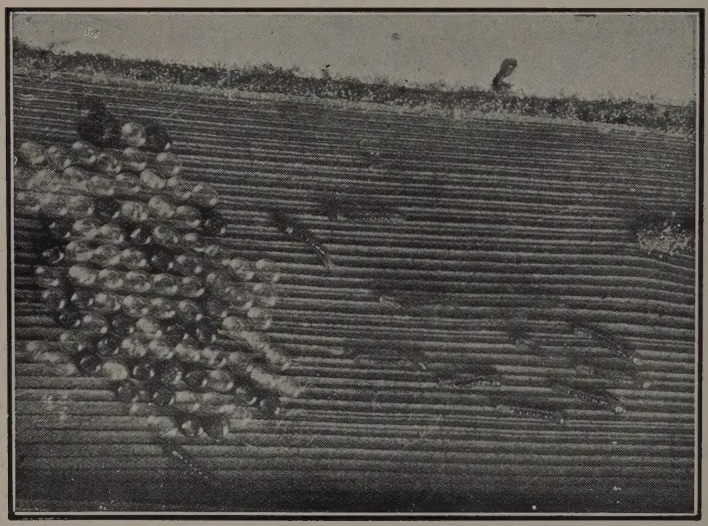

FIG. 2. GRUBS OF XANTHORHOE PRAEFECTATA HATCHING FROM A BATCH OF EGGS ON FLAX-LEAF. × 6.

a dead flax-leaf. When emerging the mature ichneumon cuts a circular aperture on the upper side of the old grub-skin, near the posterior end, and gradually works its way out (Fig. 4).

Owing to the comparative scarcity of flax-grubs in the parasitized areas and in order to obtain a more definite idea concerning the actual percentages of grubs parasitized, as many young larvæ as possible are being collected from the badly attacked swamps and placed in special cages giving access to the parasite in the parasitized areas. It is expected by this means to procure sufficient

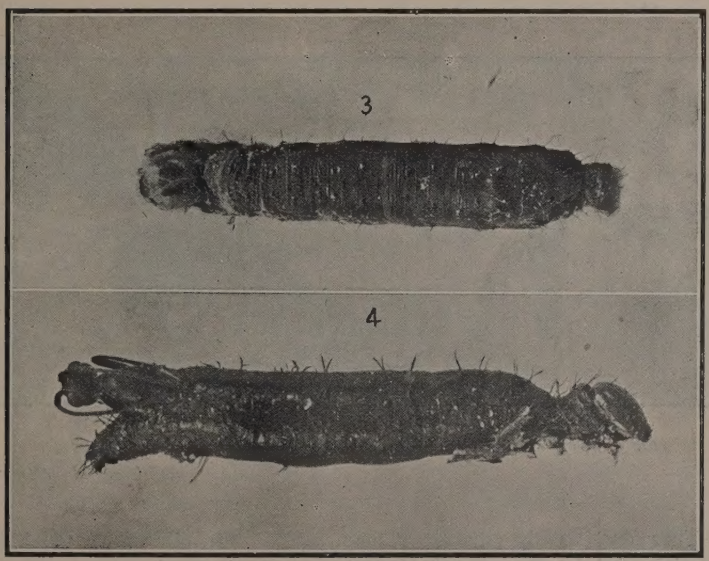

FIG. 3. PARASITIZED LARVA OF XANTHORHOE PRAEFECTATA. × 6.
FIG. 4. PARASITE EMERGING (ON LEFT) FROM DESTROYED FLAX-GRUB. × 8.

numbers of the parasite to liberate in those swamps suffering from larval attack. Why this parasite should exist in one area and not in another, although practically adjoining, is an important feature which is being gone into.

Another larger ichneumon wasp, found commonly in all the Manawatu and Waikanae flax areas, occasionally attacks the larvæ of *X. praefectata*, but, unlike the foregoing species of ichneumon, pupates in the pupæ of *X. praefectata* and not in the grubs. This species, so far as can be seen at present, does not confine its attention sufficiently to *X. praefectata* to be of much use in controlling the grubs.

In the article already referred to it was stated that the larvæ of a hover-fly—*Syrphus ortas* (Fig. 5)—attacked the larvæ of *X. praefectata*. This fly is also very common in those flax areas comparatively free from larval attack, and doubtless plays a certain part in the control of these grubs.

The other flax-grub (*M. steropastis*), which attacks the edge of the leaf, and not the lower surface, as does the larvæ of *X. praefectata*, is attacked by another species of parasitic fly—*Phorocera marginata* (Fig. 6). However, both this parasite and *S. ortas* attack several other species of larvæ besides the flax-grubs.

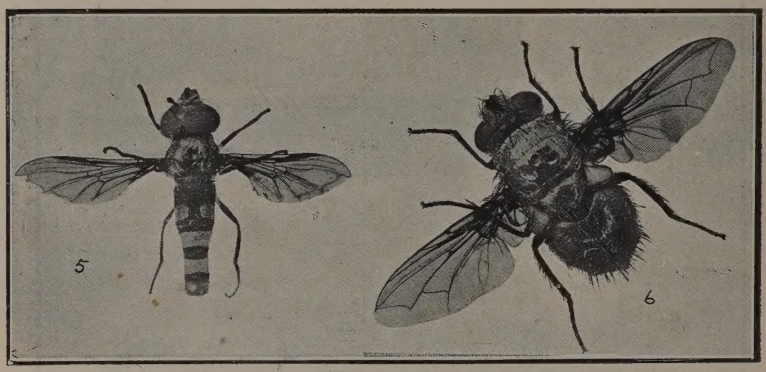

FIG. 5. SYRPHUS ORTAS. FIG. 6. PHOROCERA MARGINATA.

[*Photos by D. Müller.*

Therefore, as the matter stands at present, our most valuable parasitic ally in the control of the grub of *Xanthorhoe praefectata* is the small ichneumon found in the areas south of the Shannon–Foxton line and in the Riverton district.

Detailed experiments are being carried out regarding the effect of moisture upon the pupæ of the flax-grubs, both of which usually pupate in the ground. A full account of the results will be published later on when the work is more complete. The information collected to date shows that moisture is apparently an important factor of control.

The Te Aroha variety of strawberry has done very well at Ruakura, where it was established three years ago. It has been a regular bearer of fruit of good medium size, ripening during the first week in November.

TUTU POISONING IN CATTLE.

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A LARGE amount of investigation has been carried out, and is still being continued, with a view to establishing a definite cure for tutu (*Coriaria ruscifolia*) poisoning in cattle. All the information in our possession at the present stage warrants us in dividing, for all practical purposes, tutu poisoning into three degrees of severity: (1) When the animal has consumed a large amount of tutu, in which case there is no cure; (2) when the amount of tutu eaten is not sufficient to cause rapid developments, in which case cures should be tried, and may be successful; (3) when tutu has been eaten in small quantities (as is common) and the animals recover of their own accord, and then soon acquire a certain amount of tolerance to the effect of the plant.

As to treatment, it may be stated in the first instance that nearly every stockowner or drover has his own absolute cure, which is usually promptly condemned by others who try it. However, taking the action and symptoms induced by the poison, I would place treatment in the following order: Bleeding from the neck, or if the animal possesses horns these should be sawn off close to the head. This will allow of sufficient bleeding. Administer also (if this can be done) a dose of Epsom salts to clear out as much of the poison as possible, and when the animal, as is generally the case, gets "blown" introduce a probang through the mouth right into the stomach; then withdraw the stiletto and allow the gas to escape. Before withdrawing the probang a funnel can be placed in it, and small quantities of medicine introduced right into the stomach, thereby avoiding the risk of choking. A quantity of lime-water, a cupful or more of a solution of ammonium bromide and potassium bromide, 2 drams of each, dissolved in the water, or 2 drams of chloral hydrate in the same quantity of water, may do a great deal of good.

When there is much excitement and it is dangerous to drench, hypodermic injections can be used, such as 2 grains of arecolin, followed by the trochar and cannula. This instrument is introduced into the large stomach by plunging it into the left flank, taking as a guide about a hand-span from the last rib, the wings of the spine,

and the haunch-bone. Afterwards withdraw the trochar, and leave in the cannula, through which the gas will escape.

Many cases will be found, however, where energetic treatment must be at once adopted, and little time is allowed to secure instruments or drugs. In such cases a sharp pocket-knife will draw blood, and can also be used instead of a trochar and cannula, the finger or neck of a bottle being used to keep the wound open. A larger opening at this spot could be made and the whole of the contents of the stomach removed, but this requires considerable experience, as care must be taken that no fluid or other material is allowed to escape into the abdominal cavity. The stomach, as also the flank, requires to be stitched up afterwards, and the animal kept on a low diet for a few days.

It may be mentioned that a cow heavy in calf is apt to slip it if she has eaten sufficient tutu to cause convulsions or hoven, but should the poison not so act at the time and the fœtus live, there should be no interference with natural calving.

USE OF BICARBONATE OF SODA FOR THE REDUCTION OF ACIDITY IN CREAM.

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THE use in New Zealand of neutralizers for the purpose of reducing the acidity of sour cream dates from the introduction of the home separation system of buttermaking in our dairy factories. Under the whole-milk system pasteurization had not been generally adopted at that time, but the less frequent deliveries under home separation produced a cream of much poorer quality and higher acidity. It was soon evident that if a high-grade butter was to be made pasteurization was a necessity, and the difficulty of dealing with very sour cream presented itself. The use of an alkali to reduce the acidity of the cream was the next step, and after numerous experiments with lime, carbonate of soda, bicarbonate of soda, &c., the last-named was almost generally adopted. Bicarbonate of soda has many advantages. It is cheap, quick in its action, and is in common use as an ingredient of other food products; but it must be used with discretion or a strong soda flavour will be imparted

to the butter. For the sake of simplicity bicarbonate of soda is hereafter in these notes termed "soda."

Most factory-managers can recall days on which it seemed impossible to bring down the acidity of the cream, and the more soda was added the higher the acid rose. Thus, if it was desired to reduce 100 gallons of cream which showed 0·4 per cent. of acid in the receiving-vat to 0·1 per cent. leaving the pasteurizer, and 4 lb. of soda were added, the acidimeter-reading might be 0·15, while if more soda were added the acidity of the cream would possibly rise to 0·2 instead of being reduced. This is due to the fact that if too much soda is added to the cream the acidimeter-readings are quite unreliable.

A rise in the acidimeter-reading as the result of the presence of too much alkali seems to be contrary to all reason, but experience has shown this to be so, and any one wishing to satisfy himself on this point can do so in the following manner: Take some cream which has been neutralized to 0·15, correct reading, and add a pinch of soda. Warm the cream over the spirit-lamp and then test it for acid. Continue adding soda in small quantities, heating and testing for acid, and it will be found that the acidimeter-readings gradually fall, then as the amount of soda present becomes excessive they will rise again to over 0·2 per cent. Now take some sour cream to which no soda has been added, and add a little at a time to the cream containing the excess of soda. Heat and test as before, and the acidimeter-readings will gradually fall and then rise again.

The following examples which occurred in actual work will serve to illustrate this point: A vat of cream which was obviously overloaded with soda showed 0·27 of acid leaving the pasteurizer. By adding more sour cream the acidity was reduced to 0·1 per cent. In another case a vat of 200 gallons of cream showed 0·1 of acid on leaving the pasteurizer, and the addition of 50 gallons of sour cream to the receiving-vat reduced the acidity to 0·08. The explanation seems to be that an excess of soda causes a reaction and renders the acidimeter-readings unreliable.

The presence of too much soda can be detected by a bitter taste in the pasteurized cream; by the pasteurizer boiling over; by the appearance of innumerable small bubbles in the cream passing over the cooler; and by the formation of a pink ring immediately the indicator is dropped into the sample to be tested.

In order to maintain an even percentage of acidity in the pasteurized cream it is necessary to have two receiving-vats, or one vat divided into two sections. Cases can be quoted where good work has been done with only one vat, but it is much more difficult

to keep the acidity uniform, and there is more likelihood of using an excess of soda. Unless a proper system is followed the best results cannot be expected. Though the cream in the cooling-vats may show the acidity aimed at, there may have been a wide variation in the acidity as it left the pasteurizer. Again, if the amount of soda required is only guessed at a test cannot be made nor any error rectified until a certain quantity of cream—perhaps sufficient to spoil the day's make of butter—has passed through the pasteurizer.

The practice of adding so-many pounds or measures of soda to a vat without first trying the acidity is quite wrong, as there may be ten points or more of difference between the acidity of one vat of cream and the next. To quote a case in point: the practice at a certain factory was to add four tins of soda to each vat of 150 gallons of cream without first testing it for acid. The four tins of soda weighed $4\frac{3}{4}$ lb. The first vat filled in the morning showed an acid-content of 0·31 per cent. $4\frac{3}{4}$ lb. of soda would neutralize all the acid in the cream and leave 0·87 lb. over. The last vat filled in the afternoon showed 0·41 per cent. of acid. If the usual four tins of soda had been added this vat would have been reduced to 0·03. It may well be asked what effect the excess of soda added to the first vat would have on the butter made. Such practice is probably the cause of the soda flavour complained of in some of our butter.

A good plan is to fill the receiving-vat to a mark a few inches below the top, the quantity which it holds to that point having been previously ascertained. This will allow room for the cream to swell after the soda is added. Thoroughly stir the cream, so that a representative sample can be taken, and then test for acidity. Assuming that the acidity is 0·5, and it is desired to reduce it to 0·1, the following calculation will give the amount of soda required for a vat of 1,500 lb. of cream. Subtract the degree of acidity desired—namely, 0·1, from the acidity-reading of the cream in the vat (that is, 0·5 per cent.)—and we have 4 per cent. of acidity to be taken out, and proceed thus:—

$$\frac{1{,}500 \times 0{\cdot}40 \times 1}{1{,}000 \times 0{\cdot}12} = 5 \text{ lb. of soda required.}$$

The following table will give the amount of soda required to reduce practically any quantity of cream any number of points. It is not claimed that it is correct under all conditions, this being chiefly owing to the variation in the strength of the soda, but it is so close that if used in conjunction with the acidimeter no over-dosing with soda is likely.

ACIDITY-REDUCTION TABLE FOR CREAM.

——	Per Cent. of Reduction desired.												
	0·10	0·11	0·12	0·13	0·14	0·15	0·16	0·17	0·18	0·19	0·20	0·22	0·24
Pounds of Cream.	Pounds of Soda required.												
500 ..	0·41	0·46	0·50	0·54	0·58	0·62	0·66	0·70	0·75	0·79	0·83	0·92	1·00
600 ..	0·50	0·55	0·60	0·65	0·70	0·75	0·80	0·85	0·90	0·95	0·10	1·10	1·20
700 ..	0·58	0·64	0·70	0·75	0·81	0·87	0·93	0·99	1·05	1·10	1·16	1·28	1·40
800 ..	0·66	0·73	0·80	0·86	0·93	1·00	1·06	1·13	1·20	1·26	1·33	1·46	1·60
900 ..	0·75	0·82	0·90	0·97	1·05	1·12	1·20	1·27	1·35	1·42	1·50	1·64	1·80
1,000 ..	0·83	0·91	1·00	1·08	1·16	1·25	1·33	1·41	1·50	1·58	1·66	1·82	2·00
1,100 ..	0·91	1·00	1·10	1·19	1·28	1·37	1·46	1·55	1·65	1·74	1·83	2·00	2·20
1,200 ..	1·00	1·10	1·20	1·30	1·40	1·50	1·60	1·70	1·80	1·90	2·00	2·20	2·40
1,300 ..	1·08	1·19	1·30	1·40	1·51	1·62	1·73	1·84	1·95	2·05	2·16	2·38	2·60
1,400 ..	1·16	1·28	1·40	1·50	1·63	1·75	1·86	1·98	2·10	2·21	2·33	2·56	2·80
1,500 ..	1·25	1·37	1·50	1·60	1·75	1·87	2·00	2·12	2·25	2·37	2·50	2·74	3·00
1,600 ..	1·33	1·46	1·60	1·70	1·86	2·00	2·13	2·26	2·40	2·53	2·66	2·92	3·20
1,700 ..	1·41	1·55	1·70	1·80	1·98	2·12	2·26	2·40	2·55	2·69	2·83	3·11	3·40
1,800 ..	1·50	1·65	1·80	1·90	2·10	2·25	2·40	2·55	2·70	2·85	3·00	3·30	3·60
1,900 ..	1·58	1·74	1·90	2·00	2·21	2·37	2·53	2·69	2·85	3·00	3·16	3·58	3·80
2,000 ..	1·66	1·83	2·00	2·10	2·33	2·50	2·66	2·83	5·00	3·16	3·33	3·66	4·00
3,000 ..	2·50	2·75	3·00	3·25	3·50	3·75	4·00	4·25	4·50	4·75	5·00	5·50	6·00
4,000 ..	3·30	3·66	4·00	4·33	4·66	5·00	5·35	5·66	6·00	6·33	6·66	7·30	8·00
5,000 ..	4·16	4·58	5·00	5·40	5·83	6·25	6·66	7·00	7·50	7·90	8·33	9·16	10·00

——	Per Cent. of Reduction desired.												
	0·26	0·28	0·30	0·32	0·34	0·36	0·38	0·40	0·42	0·44	0·46	0·48	0·50
Pounds of Cream.	Pounds of Soda required.												
500 ..	1·08	1·16	1·24	1·33	1·41	1·50	1·58	1·66	1·75	1·84	1·91	2·00	2·08
600 ..	1·30	1·40	1·50	1·60	1·70	1·80	1·90	2·00	2·10	2·20	2·30	2·40	2·50
700 ..	1·51	1·62	1·74	1·86	1·98	2·10	2·21	2·32	2·45	2·56	2·68	2·80	2·90
800 ..	1·72	1·86	2·00	2·12	2·26	2·40	2·52	2·66	2·80	2·92	3·06	3·20	3·33
900 ..	1·94	2·10	2·25	2·40	2·54	2·70	2·84	3·00	3·15	3·28	3·45	3·60	3·75
1,000 ..	2·16	2·32	2·50	2·66	2·83	3·00	3·16	3·32	3·50	3·64	3·83	4·00	4·16
1,100 ..	2·38	2·56	2·75	2·92	3·10	3·30	3·48	3·66	3·85	4·00	4·20	4·40	4·56
1,200 ..	2·60	2·80	3·00	3·20	3·40	3·60	3·80	4·00	4·20	4·40	4·60	4·80	5·00
1,300 ..	2·80	3·02	3·25	3·46	3·68	3·90	4·10	4·32	4·55	4·76	4·98	5·20	5·41
1,400 ..	3·00	3·26	3·50	3·72	3·98	4·20	4·42	4·66	4·90	5·12	5·36	5·60	5·83
1,500 ..	3·20	3·50	3·75	4·00	4·24	4·50	4·74	5·00	5·25	5·48	5·75	6·00	6·25
1,600 ..	3·40	3·72	4·00	4·26	4·52	4·80	5·06	5·32	5·60	5·84	6·13	6·40	6·66
1,700 ..	3·60	3·96	4·25	4·52	4·80	5·10	5·38	5·66	5·95	6·20	6·51	6·80	7·08
1,800 ..	3·80	4·20	4·50	4·80	5·10	5·40	5·70	6·00	6·30	6·60	6·90	7·20	7·50
1,900 ..	4·00	4·43	4·75	5·06	5·38	5·70	6·00	6·32	6·65	7·16	7·28	7·60	7·91
2,000 ..	4·20	4·66	5·00	5·33	5·66	6·00	6·32	6·66	7·00	7·32	7·66	8·00	8·33
3,000 ..	6·50	7·00	7·50	8·00	8·50	9·00	9·50	10·00	10·50	11·00	11·50	12·00	12·50
4,000 ..	8·66	9·33	10·00	10·66	11·32	12·00	12·66	13·33	14·00	14·60	15·33	16·00	16·66
5,000 ..	10·00	11·66	12·50	13·32	14·00	15·00	15·80	16·66	17·50	18·32	19·16	20·00	20·80

Careful experiment with cream ranging from 0·2 to 0·7 per cent. of acidity has shown that 1 lb. of Crescent brand soda (the brand most commonly used) will reduce the acidity of 1,000 lb. of cream 0·12 per cent., and the table has been calculated from these figures. The first column represents the number of pounds of cream to be utilized. The top line is the percentage of acidity to be taken out of the cream, not the acidity of the cream, in the vat. To find the number of pounds of soda required subtract the acidity desired from the acidity of the cream in the receiving-vat, then follow along the line opposite the number of pounds of cream in the vat until the column under the percentage of acidity to be taken out is reached. For example, as already shown, the reduction of 1,500 lb. of cream from 0·5 to 0·1 will require 5 lb. of soda.

Unless care is taken the table will not be of much value. The quantity of cream must be known to a few pounds. It must be

thoroughly mixed so that the sample tested is representative of the whole. The test must be properly made, and the soda weighed correctly and completely dissolved. The soda solution must be carefully stirred into the cream. To get the weight of cream correct add up the suppliers' dockets as the cream is being weighed in, and put a mark on the vat for each 100 lb. added. For mixing, nothing is better than a wooden plunger with a big head, or a cheese-rake. Metal plungers knock the tin off the vat.

A common mistake in making an alkaline test is to add more than the two drops of indicator recommended in the Department's bulletin dealing with this subject (No. 10, "The Acidimeter and its Use"). This is apt to be misleading, as the pink colour shows more readily when an excess of indicator is present. On the other hand, to get too deep a shade of pink will make the reading too high and render any table unreliable. For example, take a vat of 2,000 lb. of cream showing 0·4 per cent. of acid, correct reading. To reduce this to 0·1 per cent. will require 5 lb. of soda. If by working at too deep a shade of pink the reading is taken as 0·42 per cent., then 5·33 lb. will be required and the cream will be reduced to 0·08, correct reading. The reading should be taken immediately the pink colour shows an inclination to remain permanent.

In order to ensure accuracy it is advisable to weigh the soda, and a small set of scales should be kept for this purpose. Measuring is not reliable. It is best to use hot water to dissolve the soda, as it is quicker and mixes with the cream more freely. An impression is current among managers that when dissolved in hot water the soda is not so strong, but careful trials with hot and cold water do not show any difference. There is also less trouble with froth in the receiving-vats when hot water is used, and the warm solution mixes more readily with the thick sour cream.

All acidimeter-readings of neutralized cream here mentioned were taken as the cream left the pasteurizer after being treated to 200° or over, the pasteurizing-temperature having a direct influence on the amount of soda required. It need hardly be stated that there is very little chemical action between the soda and the lactic acid present in the cream until heat is applied. The acidity of the cold cream in the receiving-vats is only reduced a few degrees when the soda is added. If for any reason the pasteurizing cannot be proceeded with for a number of hours after the soda is added it will be found necessary to add nearly as much soda as was used in the first instance in order to make the desired reduction in the acid when the pasteurizer is started later on. The completeness of the chemical combination between the soda and the lactic acid depends

to a great extent on the pasteurizing-temperatures. Where cream containing 0·4 or more of acid is being treated under the two-stage system of continuous pasteurization, and the temperature is raised to 170°–180° F. in the first pasteurizer and to 200° in the second, an acid test from the first machine may show 0·15 per cent. of acid, while the same cream after passing through the second machine shows only 0·08 per cent. If the temperature of the first machine is raised to 190° the difference will probably be only three or four points.

When treating comparatively sweet cream of about 0·25 per cent. of acid there will not be the same difference between the acidity of the first and second pasteurizers. In other words, the soda acts more freely at the lower pasteurizing-temperatures when only a small quantity is required to bring the acidity of the cream down to a certain point. At a temperature of 175° on the first machine, and 200° on the second, there will be a difference of about 0·04 in the acidity, and if the temperature of the first machine is raised to 190° it will be a point or two less. The difference in the acidity of the two pasteurizers will be greatest with all classes of cream when a very low percentage of acid in the neutralized cream is aimed at.

This goes to show that when pasteurizing sour cream at comparatively low temperatures a certain amount of the soda is not made use of; also, the amount of unused soda is greater with very sour cream than with comparatively sweet cream; further, if the full neutralizing effect of the soda used is to be got, very high pasteurizing-temperatures are necessary when treating very sour cream, more especially where a low percentage of acid is aimed at; lastly, if a very low neutralizing-point is not aimed at with comparatively sweet cream a high pasteurizing-temperature is not necessary to get the full effect of the soda used.

The use of a neutralizer is only necessary owing to defects in the cream, and as the risks attending its use increase as the quality of the cream gets poorer, an improvement in the quality of the latter should be the aim of every one connected with the butter industry.

In the article "Wind-breaks for Fruit-farms," published in last month's *Journal*, the author was made to say that "Within the last *six* years many an orchard or garden has been established where the already existing mixed native shrubbery has served as its wind-break." This was a misprint for *sixty* years—*i.e.*, from the early days of settlement.

THE "PEDIGREE TREE" AND SCION-SELECTION.

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THE question recently raised by Mr. D. Hay, of Auckland, at a meeting of the Huapai Fruitgrowers' Association, concerning the possible advantages to be gained by raising "pedigree trees" will no doubt be of considerable interest to the majority of New Zealand fruitgrowers. What is meant by the term is trees raised from wood selected from a parent tree possessing all the commendable characteristics of the variety, such as constitution and vigour, freedom from disease, quantity, quality, and colour of fruit, &c.

This idea, although, as far as I am aware, published for a first time by Mr. Hay, is by no means new. The possibilities of scion-selection have from time to time in the past been considered by those interested in fruitgrowing in various parts of the country. Several years ago some of the leading fruitgrowers of the Nelson District who were interested in the affinity of stock and scion also took up the question of scion-selection, but, as far as I am aware, no definite attempt to test the idea was ever made.

Theoretically, the idea may at first glance appear sound, but when the matter is considered a little more carefully it becomes extremely doubtful whether any practical advantage would be gained. Scion-selection, to my mind, cannot be placed in the same category as ordinary plant-selection. There are a large number of plants that fail to come true from seed. All horticulturists are aware that many such plants have to be raised from cuttings or similar means in order to retain the strain. Fruit-trees are included in this category. Others, again, which are comparatively fixed in habit, may sport or otherwise change in habit and produce an improved strain. It is true that fruit-trees sometimes sport, but in this case a fruit of an entirely different character is produced. In any case this sporting habit is too rare to be worthy of consideration in this discussion.

With our common practice of raising fruit-trees, however, the position is quite different. An apple-tree, for instance, is made up of two component parts—the stock and the scion—and practically an extension of the same wood is used in each case, thereby lessening, if not altogether eliminating, the possibility of variation. While this is

so, environment may affect a variety, such as the Sturmer, to the extent of altering its character, rendering it no longer a suitable tree for propagation. I consider this extremely doubtful, however, and am of the opinion that trees raised from such a source would immediately assume their natural habit if planted under suitable conditions.

On the other hand, assuming that scion-selection is practically sound, the problem of raising the ideal trees is not yet solved. If it is possible for the wood of a variety to deteriorate, the same must be conceded as regards the root, as practically the whole of our trees are worked on the same root-stock—the Northern Spy. We must therefore look to our stock also.

There is another matter for consideration if the idea of scion-selection is sound, and that is from what class of tree the scions should be taken. Trees bearing the characteristics previously mentioned, or, rather, possessing one or the other of these characteristics, may be frequently found in our orchards, but rarely will a tree be found combining the whole, as one state is largely a contradiction of the other.

Vigorous-growing, robust trees rarely bear a heavy crop of highly coloured fruit. This does not occur until vigorous growth ceases and the tree begins to deteriorate. In some localities fruit colours well naturally, but this is due to climate, soil, and treatment rather than to strain. Heavy crops and high colour invariably indicate lack of vigour, in which case the size of the fruit is usually small. Continued lack of vigour means loss of weight—either the fruit becomes small or the crop lighter. A tree of this kind is on the decline. Trees grown in grass invariably produce firmer and better-coloured fruit than the same variety under cultivation, but this state is not likely to last long, as the tree is on the downward grade. Turn the sod in and work the soil well, and the trees will sooner or later revert to the usual type. The fruit will be less highly coloured, but larger, and the crop heavier.

Now, the question is from which class of tree the buds should be taken—from the robust tree or the tree bearing highly coloured fruit. If compelled to choose I would select the tree that has steadied down—that is, the one bearing highly coloured fruit. Not that I should expect to raise a tree that would bear highly coloured fruit. This, I feel sure, would not take place unless the resultant tree was submitted to the same treatment as the parent. The selection would be made according to the customary horticultural rule of selecting the wood of a hardy mature plant rather than that of a vigorous plant, acting on the principle of it being better to work up than down.

In conclusion, I wish to explain that I am not opposed to scion-selection in so far as the careful selection of suitable wood for working is concerned, but merely doubt the practicability of scion-selection on the lines suggested and announced. There is in the average nursery plenty of suitable wood to hand, without the same possibility of introducing disease that would attend the selection of scions from mature orchard-trees. Nursery trees, although not mature, are not necessarily vigorous-growing trees; therefore any objection to the common practice of selecting the best of this wood for working is likely to prove one of the least that can be urged against the average nurseryman.

THE SEASON'S LAMBING.

SOUTH ISLAND AND DOMINION ESTIMATES.

THE Department's estimate of the present season's lambing in the North Island, together with corresponding figures for the two previous years, was published in last month's *Journal*. A similar estimate for the South Island, also Dominion statistics on the same basis, are now presented, as follows:—

SOUTH ISLAND LAMBING.

Year.	Number of Ewes put to Ram.	Estimated Average Percentage of Lambing.	Estimated Number of Lambs.	Actual Number of Lambs tailed.
1917	5,784,751	87½	5,072,307	(Not yet collected.)
1916	5,662,317	80	4,529,853	4,547,589*
1915	5,938,258	80	4,777,451	4,599,628

DOMINION LAMBING.

Year.	Number of Ewes put to Ram.	Estimated Average Percentage of Lambing.	Estimated Number of Lambs.	Actual Number of Lambs tailed.
1917	13,260,169	87½	11,611,340	(Not yet collected.)
1916	12,892,767	83¼	10,733,579	10,760,162*
1915	12,581,825	83½	10,530,780	10,370,771

*The returns for Waimea County being incomplete, the 1915 figures for that county have been taken in the total.

STRATFORD MODEL DAIRY FARM AND EXPERIMENTAL AREA.

J. W. DEEM, Fields Supervisor, Wanganui.

THE idea of establishing a model dairy farm and experimental area at Stratford, in mid-Taranaki, emanated from the Stratford Agricultural and Pastoral Association some five or six years ago. Repeated representations were made to the Ministers of Agriculture and Education on the subject, and although they expressed their approbation of the end in view, the Government could not see its way to provide the necessary capital funds to establish the farm.

About a year ago a suggestion was made that the district should find the farm and the money to equip it, when perhaps the Government would grant a subsidy to assist in the working. The association felt, however, that the scheme would require general public support in order to obtain the necessary capital to comply with this suggestion and before it could be brought to fruition. The association therefore convened a conference of delegates from local bodies and co-operative dairy companies to consider the matter, and this conference set up a committee representing the various interests in the district. The duty of the committee was to formulate a practical scheme to establish a model dairy farm and experimental area near Stratford, and it submitted a report of which the following were the salient features:—

(*a.*) That it was necessary to provide an area of land suitable to demonstrate to farmers by practical working methods how to increase the productivity of the soil, and to thus enable farmers to conveniently obtain such practical advice and knowledge as would enable them to follow improved farming practice.

(*b.*) It was also necessary to provide an area of land which could be utilized by the Taranaki Board of Education for demonstration and educational purposes in connection with the Stratford High School.

(*c.*) It was believed that farmers and pupils of the State schools would be greatly benefited by the establishment of such a farm and the demonstration of approved farm methods it would afford.

(*d.*) It was proposed that the management should be controlled by a local committee, with a chairman to be appointed by the Minister of Agriculture.

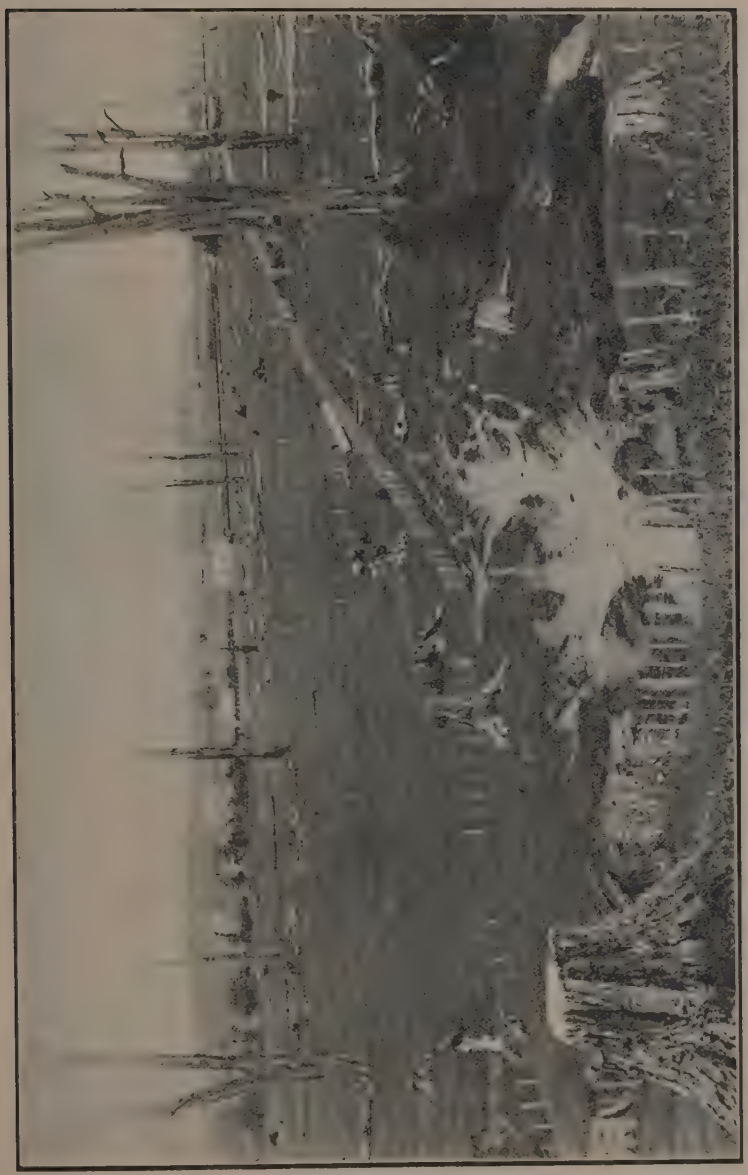
(*e.*) That the land must be typical of the district, and so situated as to enable inspection to be made at a minimum of trouble and expense; that the price must be reasonable; and that it must be sufficiently close to the High School to meet the requirements of the Board of Education.

(*f.*) That the capital expenditure necessary to purchase a freehold was out of the question at the present time, but it was considered that the value of the scheme would increase as operations and experiments extended, and the possibility of ultimate purchase should be provided for.

The task of selecting and securing an option over a suitable area was by no means an easy one, but ultimately the committee secured an option to purchase the goodwill of a leasehold of 143 acres. This lease provided for full compensation for improvements and certain rights of purchase. The requisite capital expenditure was estimated at £2,500, and as demonstration and experimental work was to be undertaken it was obvious that the returns would not for a time pay working-expenses. Accordingly the Government was approached for financial assistance, and the Minister of Agriculture offered a subsidy of £300 per year for five years, provided the capital funds were found locally and the farm worked on the lines submitted to him.

Opinion was divided as to the best means of providing the necessary capital, some being of opinion that the money should be found by the County Council, while others thought it should be provided by the dairy companies. However, after due consideration the committee came to the conclusion that the most feasible and expeditious method would be to get private individuals to give a guarantee and borrow the money from a bank. Representative men of the district were asked to give their support in this way, and the matter was quickly arranged. In order to safeguard the guarantors it was agreed that so long as their liability existed they should have the right to elect half of the elective members of future management committees.

The necessary details having been satisfactorily arranged, a public meeting was called and a society formed to give effect to the scheme under the name of the Stratford Model Dairy Farm and Experimental Area Society. Rules were drafted and adopted, the society was duly incorporated, the farm secured, and the scheme fairly launched. The society started with a membership of seventy-three, and it elected as its first committee Messrs. J. W. Boon, R. Dingle, S. Pitt,



STRATFORD MODEL DAIRY-FARM SITE, SHOWING CENTRE OF FARM IN CONDITION WHEN TAKEN OVER BY SOCIETY.

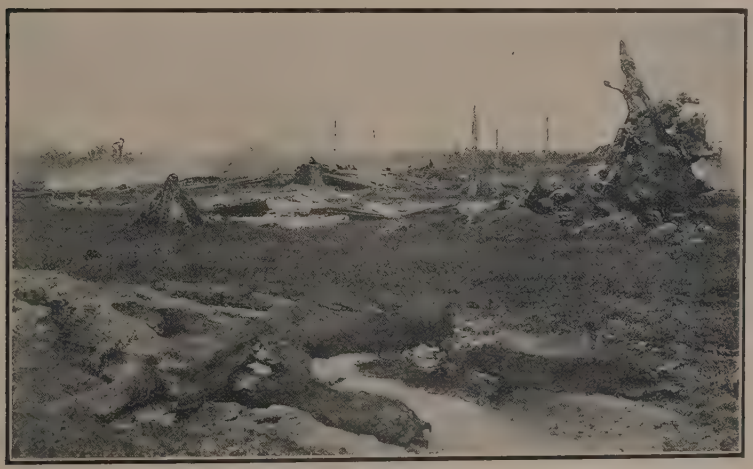
F. Ranford, J. B. Richards, and W. H. Were. The writer, as District Fields Supervisor of the Department of Agriculture, was appointed chairman by the Minister of Agriculture.

The farm acquired consists of 143 acres on the Ohura Road, adjoining the Borough of Stratford, and within one mile of the post-office. The land is fairly level and of average quality. It was originally all under heavy bush, but, with the exception of a small patch left for shelter, the bush has been felled for between twenty-five and thirty years, and the land is now mostly bleak and wind-swept. Two or three acres had been properly stumped, and the smaller stumps had been removed from another 15 or 16 acres, while about 20 acres in all had been ploughed by going round the larger stumps. Fully one-third of the ploughed area had not been sown down, and is now a mass of couch and sorrel. The remainder of the farm was still in stumps. With the exception of 2 or 3 acres no top-dressing had been done, and the pastures are now thin and run out. There is a little cocksfoot and rye, a fair amount of *Poa pratensis*, and considerable miscellaneous rubbish. Blackberry, ragwort, and yellow broom are present, but not in alarming quantities. The whole of the pastures require renewing either by cultivation or top-dressing. The fencing, with the exception of one fence dividing the farm in two, is done for and will require renewing. The buildings consisted of a small cottage in bad repair and a make-believe cow-shed. The former was worth repairing, but the latter had to be removed. Altogether the property was in bad condition, having been occupied by tenants who had done little to improve it. The farm is bounded on the south by the Patea River, and the latter, together with two internal streams, provides ample permanent water. When taken over on 1st July last the farm was eaten out and quite devoid of feed. It may be mentioned here that the promoters were of opinion that the establishment of this farm under disabilities quite as severe as the ordinary farmer has to meet would prove of more demonstrative value than had those disabilities not existed.

The Education Board purposes securing an area of land adjoining the society's farm and establishing on it a residential high school with a strong bias towards agriculture. The society has also come to an arrangement with the Board whereby the latter may take over at a cheap rental an area not exceeding 20 acres of the society's farm, as required for school-farm work. It is hoped that the officers of the Education Board, the Farm Society, and the Department of Agriculture will work in co-operation, and that the work done will form part of one whole scheme. In working the school area the society will, when convenient, provide horses and implements. On the other hand, it is anticipated that the pupils under their instructor

will assist in keeping the society's farm records, such as in cropping and cow-testing, also assist at times with some of the lighter farm-work. Considerable assistance should thus be given to pupils taking the course in agriculture. They will not only have the theory of agriculture taught them by the school, but they will be able to participate in approved farm practice as directed by practical farmers.

The energies of the society—for the first year at least—will be chiefly in the direction of repairing fences, erecting buildings, and providing food for the dairy herd. A little demonstration work in



CLEARING THE COW-SHED SITE.

the way of top-dressing of pastures and the growing of root and fodder crops will be taken in hand, but it is felt that not very much can be attempted this first season. Owing to the scarcity of feed and the backward state of the farm, cows could not be purchased until late in the season, when there was little choice. The committee therefore decided to buy about thirty crossbred cows for the initial period. Later a more definite herd policy can be laid down.

The scope of the society is practically unlimited, and continuous and enthusiastic attention to the undertaking will undoubtedly bring fruitful results.

A recent Commonwealth Proclamation appoints a quarantine-station for imported animals at Fremantle, Western Australia.

THE BUDDING OF FRUIT-TREES.

W. H. TAYLOR, Horticulturist.

BUDDING is universally adopted as the best and most economical method of raising young trees. It is also the best way to rework old trees of stone-fruit species, which do not readily conform to grafting. The reworking of pip-fruits is usually effected by grafting because that method saves a year, otherwise budding would be best for those trees also, the union of a bud with the stock being more certainly perfect than that formed by a graft. Buds should be taken from thrifty trees, as to some extent at least "like begets like." It may well be that certain trees are a better type and produce generally better results than others of the same kind. Common-sense should lead one to propagate the better type, although in all probability the difference in the trees is due to treatment and not inherent. Every perfect bud contains the rudiments of a tree. Buds for working must be fully developed, but not ripe. The shoot from which a bud is taken must not have completed its growth. Sap must be flowing in both the stock and the shoot from which the bud is taken, otherwise there will be no flow of the juices that are necessary to form the union.

THE TIME TO BUD.

This is to some extent influenced by the state of preparedness of the stock. The buds are taken from the new shoot, and the stock-wood must be of the same age as the wood the bud comes from, so that the sap of both is in the same state of elaboration. The buds on a shoot are not all ready at the same time, a circumstance that admits of some extension in the time for budding, so that several weeks may pass between the time when the forward stocks are worked and the working of the weaker ones, which are left to strengthen as long as possible. The order of budding is as follows, although there may be some overlapping because of the unpreparedness of stocks, and also a difference in the readiness of the buds of different varieties of the same fruit. The extension of time is ruled by two circumstances: there must still be growth in the bud-wood, or the buds will be too ripe; and there must be growth in the stock, or there will be no flow of sap to form the union.

First come cherries, in December; secondly, apricots; thirdly, plums, apples, and pears; and, fourthly, nectarines and peaches, the time for the latter being from the latter half of February through March.

THE BUD TO TAKE.

The necessity for securing sufficient growth in the stock bars the use of the buds first formed, which are, of course, near the base of the shoot; nor is it advisable to work too early, as the buds are to remain dormant till the following spring. For these reasons budding is delayed till as late as the state of growth in the bud-wood will admit. At the time of budding the first-formed buds will be too ripe. Those on the upper end of the shoots do not elaborate completely. The bud is in consequence taken from the middle portion of the shoot, rather nearer the base than the top. This rule is not a hard-and-fast one, but is a safe guide for beginners. The shoots from which the buds are taken should be of medium thickness. The buds on gross shoots are too soft, and those on weak shoots are too small to handle successfully. The strength of wood is, of course, comparative with the general habit of the tree. It is important that wood-buds be taken: a blossom-bud will not grow. As a rule there is no difficulty in distinguishing wood-buds: they are usually thinner and more pointed than fruit-buds. With peaches and nectarines it is best to take treble buds, as one of them is sure to be a wood-bud. The same applies, though in a lesser degree, to the cherry, apricot, and plum.

BUD-STICKS.

When budding operations commence the initial step is to secure the buds. The shoots are cut from the tree, the upper and lower portions cut off, and the leaves removed. About ½ in. of the petiole or foot-stalk of each leaf is left on. The shoots so prepared are termed bud-sticks. The bud-sticks must be kept quite fresh, the best plan being to stand them in a bucket in which there is an inch or two of water. When buds are obtained from a distance they should come packed in damp moss and bound up in tarred paper. On receipt they should be at once unpacked and immersed for two or three hours in water, then treated in the same manner as home sticks. They are to be carried in this way to the scene of operations, and each stick taken from the bucket as it is wanted.

STOCKS.

Where old trees are to be reworked by budding, a practice usually adopted for the stone-fruits (apples and pears are usually grafted), the trees must be headed down towards the end of winter or early

in spring. New growths will emerge from the stumps. A selection is made from these, and a sufficient number to form the foundation for the new tree is left evenly disposed around the stump. It is in these new branches that the buds are inserted, and all shoots not wanted should be removed while quite small. At the time of heading down, the scars where limbs were cut off should be painted over with white-lead and oil. This will not only prevent possible cracking and decay, but also the entry of disease germs, silver-blight, &c.

Young trees are made by working on stocks raised for the purpose. Cherries are worked on seedling cherries, Gean and Mazard being mostly used; apricots on seedling apricots (which in normal conditions is the best method) or on peach or plum; peaches and nectarines on peach-stocks raised from stones. The stones should be taken from vigorous trees. When removed from the fruit the stones should be dried and stored away till toward the end of June, then buried in a hole in the ground where it is not too wet. During the first half of September they are lifted and planted in nursery rows in drills about 3 in. deep. Most of the young trees will be ready for budding the same season. Peaches and nectarines are sometimes worked on plum-stocks, their purpose being for planting on wet ground. It is not certain that any great advantage is gained, but however that may be peaches are not likely to succeed on any stock if the soil is wet during summer. Plums are usually worked on Marriana or Myrobalan stocks, the latter being the cherry-plum. Both can be raised from cuttings or stones. Japanese plums do well on peach-stocks. Pears are worked on seedlings raised from pips, and some varieties on quince-stocks, which are raised from cuttings. The purpose of the quince-stock is to dwarf the trees and promote early fruiting. Dwarfing stocks are, however, now largely superfluous, as the modern system of allowing trees to fruit on the ends of laterals brings about a state of early fruiting in a better way. Apples are usually worked on the Northern Spy, more rarely on Winter Majetin. The latter, though blight-proof, is not a good stock, being a surface rooter. These stocks are raised by root cuttings, by grafting pieces of Spy wood on pieces of Spy root, and by layers.

THE OPERATION OF BUDDING.

It is highly important that the operation be carried out quickly; neither the bud nor the alburnum of the stock must be exposed to the drying influence of the air a moment longer than necessary. The work must be neatly done, the union depending on perfect work. It must also be deftly done, for there must be no injury

to bud or stock. The bud must not be bruised, and the wood of the stock must not be injured by rough manipulation of the knife. For the work a very sharp knife is required, and some strands of raphia about 12 in. long. These should be cut to the necessary lengths and looped to a strap round the waist of the workman. Plums are budded about 3 in. above the ground, as it is preferred that they make their own trunk. Other fruits are worked from 6 in. to 9 in. from the ground.

The method of making the bud, and also the cuts in the stock, admit of several modifications. These are for the experienced operator. It will be sufficient for the present purpose to explain the orthodox plan of budding. In former times it was thought necessary to remove the small chip of wood that is taken with the bud. Modern budders do not do that with pip-fruits, and some do not do it with any fruits; others still adhere to the old plan with stone-fruits. When the wood is not removed the bud is cut much thinner than it would be if the wood were to be taken out. The buds with the wood adhering are more readily pushed into the cut than the others, and the method has that advantage as well as saving time, a matter of considerable moment in large operations.

Judgment is required as to the exact thickness to cut the bud, and as this article is intended for the instruction of beginners it seems best to explain the old plan, which is more simple and equally effective. The removal of the chip of wood from the back of the bud without injuring the bark of the bud requires skill only to be acquired by practice. The way in which the bud is cut out simplifies the operation. Personally, I prefer to begin the cut below the bud, not above it, as appears to be advised by writers generally. My reason is that the lower part of the bud has not to be cut again, whereas the top has to be again cut. Also by cutting that way it may be made easy to remove the wood. Press the knife in $\frac{1}{4}$ in. below the bud, turn the blade nearly flat, and carry it up under the bud. When $\frac{1}{4}$ in. above the bud deflect the back of the knife a little so as to bring the blade out $\frac{3}{4}$ in. above the bud; then when the blade is nearly out give a quick pull upward: that will drag off a narrow strip of bark and of wood. It will be found that the bark and wood will separate at the end of the dragged-off portion, so that it is quite easy to lay hold of the wood with the point of the knife and the thumb of the hand that holds the knife. Hold the bottom end of the bud firmly between the thumb and a finger of the other hand, and pull the piece of wood sharply downward. It will then come out without injuring the bark. If the bud is too ripe the germ may come away with the wood. The germ shows as a small raised lump in the middle of

the shield, and if a hollow appears instead the bud will be useless. This will not often occur if the buds are in the proper condition.

Being ready for work, the operator turns his back to the young stock, plants a foot on either side of it slightly backward, so that the young branches, if there are any, are caught by his legs and pressed back out of the way; or he bends over and takes the stock between his left arm and left leg. He then makes a horizontal cut at the required height of the stock, inserts the point of his knife 1 in. below the first cut, and brings it up vertically to the middle of the horizontal cut. Each cut must penetrate through the bark as little deeper as can be managed. When the knife reaches the horizontal cut it is given a slight twist on either side, so as to slightly raise the bark at each intersection. A budding-knife is made with a flattened haft intended for raising the bark, but it is better to avoid using the haft, as it is liable to injure the cambium and is seldom required. If the sap is flowing freely in the stock there will be no difficulty in forcing the bud into its place, and it is better for it to make its own way than to make the opening with the haft of the knife, as the union will be closer. The lower end of the shield of the bud must go down to the bottom of the incision. The upper end will project above the cross-cut, and is to be cut off so that it will fall into place. The cut end of the shield will then be in close contact with the bark at the cross-cut.

Binding up is done by laying the middle of a strand of raphia against the back of the stock, then bringing both ends simultaneously round and across the front over the lower part of the incision. Pull both ends of the raphia rather tight in this place, as it tends to arrest the downward flow of sap and concentrate it about the bud. The next turn round the stock should bring the raphia across the upper part of the incision. The actual bud should not be covered, but the remainder of the incision should be perfectly covered in order to exclude sun and air. Except in the place mentioned for tight tying, the bandage should be firm but not tight.

It sometimes happens that the bark of the stock is very thick—this being often the case with peach-stocks—and in that case it may be difficult to force the bud in. This difficulty is met by cutting a little slice off the bark immediately over the vertical incision, and the bud will then slip in. The stub of leaf-stalk left on each bud serves to handle it. The stub is a help when binding, and also indicates the state of the bud. If it remains fresh for a week after budding the bud will have taken; if it withers in a few days the bud has failed. In case a bud fails another may be put in, but it must be in another place a little above or below the failed bud.

About three weeks after budding an examination should be made. If it is found that the ties are becoming strained by the swelling stock, run the knife through them on the back of the stock, but do not remove them, as they shade the buds. The ties are sure to require cutting inside about four weeks.

AFTER-TREATMENT.

Nothing has yet been said about cutting down the stock plants. This must not be done till the end of the next winter. There is then a choice in procedure. Some prefer to leave from 4 in. to 6 in. of the stock above the bud. This stump serves to tie the young growth of the bud to, so as to secure a straight trunk, and also to prevent its being broken by wind. Others cut down to about 2 in., and provide sticks to which to tie the young trees. Whatever is done the stump left must be cut down close to the union about midsummer. The scar soon becomes healed over. It would not be wise to cut the stock down close to the bud in the first place. Some live wood is wanted above the bud, or the wood near the bud might dry up before the bud got well started. I have been told that this contention is wrong, and that it is now the custom in some large establishments to cut close down; but I have not had an opportunity of verifying the statement, and prefer at present to keep to the old plan.

OTAIKA EXPERIMENTAL AREA.

A PROMISING series of plots of forage plants, grasses, clovers, lucerne, roots, &c., has been formed at the Department's Otaika experimental area, situated on heavy pipeclay gum land about eight miles southward of Whangarei, near the Puwera Post-office. The spot selected, adjoining the public road, covers about 3 acres, has a gentle fall on two sides, and has been pipe-drained. The ground was ploughed and subsoiled to a depth of about 11 in., and dressed with carbonate of lime at 1 ton to the acre. Manure consisted of bonedust and superphosphate applied in the seed-drills at the rate of 3 cwt. per acre. A shelter-belt has been sown on three sides of the plots, consisting of one row each of black-wattle, tagasaste, and pig-wattle (*Albizzia lophantha*). An adjoining piece of 7 acres has also been worked up for plot purposes, but is being cropped this season with oats for chaffing. The remaining 20 acres of the area remain in various pasture formations, which were laid down some years ago with successful results generally. The experimental area as a whole contrasts very strikingly with the adjacent wastes of stunted scrub, potholed by gum-diggers. The new plots have been formed under the personal direction of Mr. R. Rowan, Fields Supervisor, Auckland, who was mainly responsible for the successful gum-land experimental area near Auckland, well known as the Albany Plots.

RECLAMATION OF TIDAL-SWAMP LANDS IN NORTH AUCKLAND.

R. ROWAN, Fields Supervisor, Auckland.

BORDERING many of the tidal inlets and rivers of the North Auckland peninsula are extensive areas of more or less swampy and salt-impregnated land, ranging from mangrove mud-flats to rushy marshes and peaty swamps clothed with raupo, toetoe, flax, and kindred growth. This latter type of swamp is often only subject to occasional flooding by extra-high tides, combined sometimes with freshes from the watersheds—a feature which was much in evidence during the past extraordinarily wet year experienced in the Auckland Provincial District. Fortunately for reclamation purposes, the general rise and fall of the tide, as elsewhere on the New Zealand coasts, is comparatively moderate.

Although probably the larger proportion of these tidal swamps is still in a virgin state, a quite considerable amount of reclamation has already been carried out. Moreover, the comparatively rapid development of land-settlement of late years in the North, with an attendant rapid appreciation of land-values, is causing steadily increasing attention to be given to the breaking-in of fresh areas containing the potentiality of rich dairying and fattening pastures. The following notes aim at presenting some particulars of methods of reclamation that have been successfully adopted, and which may be found useful by less experienced workers in this branch of pioneering. Naturally, however, with such varying degrees of salt-swamp country to deal with, treatment must be adapted to special circumstances.

Some of the best-developed reclamations of the class referred to have been carried out along the tidal waters of the Kaipara and its affluents. Certain of these areas were recently inspected by the writer.

OPERATIONS ON MANGROVE AREAS.

A good example of the transformation of tidal swamp to dairy pasture may be seen on Mr. John Wilson's property at Parakai, near Helensville, the ground dealt with being mainly mangrove formation. Information regarding his methods and experience was kindly afforded by Mr. Wilson to the following effect:—

As is the case with most of this class of reclamation, the construction of a stop-bank, with a ditch on its inner side, and pro-

vided with flood-gates, was the first step in the undertaking. Holding-grasses were planted on the bank. Open drains about 2½ ft. or 3 ft. deep were made, connected with the bank-ditch.

During the year following this drainage fleabane (*Erigeron canadensis*) began to appear on the mud. This plant, which is ordinarily classed as a weed, flourishes naturally in wet situations—fresh or salt—in the North Auckland district, is relished by stock, and appears to have decided fattening-qualities. When the drainage had existed for two years the land had sunk about 2 ft. or more, and became fairly consolidated. The salt was gradually washed out by rain, and coincident with this the fleabane, of which a heavy growth had previously developed, gradually disappeared. Within five years from the commencement of operations the land became fit to grow grasses and clovers. Mr. Wilson recommends surface-sowing of grass and clover seeds — without any ploughing or disking —the germination of the seed to be encouraged by sheep and young cattle (not heavy beasts) treading it into the ground.

The stop-bank recommended by Mr. Wilson is 15 ft. to 18 ft. wide at its base, with a rise of 6 ft. to 7 ft. in height, the face of the bank to slope to the river. The bank-drain, as indicated, is within the area being reclaimed, and the spoil from it is deposited on the river side of the bank to form a slope from the bank to the river. The top of the bank is about 7 ft. in width, this making the bank sufficiently strong to resist the force of the water. If the area to be reclaimed is small, a main drain (bank-ditch) — say, 12 ft. wide by 5½ ft. deep, sloping to a bottom of about 4 ft. wide—should be sufficient to carry off all the water.

The outlet through the stop-bank should be concreted, and the flood-gate hinged and fitted close into the concrete, in order to effectively stop the inflow of water when the tide flows, and let any water out when it ebbs. A fluming is also required at the outlet for about 24 ft. to carry the water into the channel of the river, otherwise a large hole forms on the river side of the outlet, causing damage to the bank by the surface getting washed away.

Concrete pipes, 2½ ft. to 3 ft. in diameter and cemented at the joints, are suitable for the outlet through the stop-bank—if concrete itself is not easily available. Wing-walls for about 5 ft. on each side are also required on both sides of the outlet to prevent erosion from the flow of water. Concrete stop-gates are preferable to wooden gates, as the latter become warped, owing to one side being wet and the other side dry.

It has been found that buffalo and tall-oat grasses are suitable for binding together the earth on these stop-banks. I am of opinon that Western Wolths rye-grass and timothy, with red and white clover,

are most suitable for the first surface-sowing of these reclaimed lands generally.

The cost per acre of reclaiming and breaking in such land is difficult to estimate, as a great deal depends upon the length of stop-bank required. In one case it may be considerable, while in another —such as reclaiming back of a blind salt-water creek—the cost may be very much less. Mr. Wilson paid 20s. per chain for the erection of his stop-bank, but it would now cost about 40s. per chain. Concrete pipes 3 ft. in diameter, inside measurement, cost in Auckland 9s. per foot, equal to £1 7s. plus 10 per cent., but they can be produced at a much lower cost if the person requiring them moulds them on the ground, this also saving carriage. The seed for grasses would cost, say, £1 per acre.

Mr. R. E. Fenton, late farmer, Helensville, has also furnished information regarding mangrove areas. His experience was that the reclamations cost him about 17s. 6d. to 18s. per acre. He favours the use of a small bucket dredge, on the lines of those used on the Hauraki Plains drainage-works, &c. I think this would prove a great saving of labour in making the large drains. Following are extracts from his letter:—

On a piece of swamp land of about 150 acres I chose 10 acres near dry land as an experiment. I dug a drain about 4 ft. wide and 18 in. deep both inside and outside of the proposed wall, the spoil being sufficient to build a wall about 3 ft. high. In two places, where there was a small creek, the wall had to be much bigger—as high as 8 ft. In these places I put in flood-gates made of totara to take off the leakage and rainfall. Three months afterwards I sowed some mixed grasses and rape. In the open spaces the seed did not grow, but under the mangroves the rape grew as big as kohlrabi, and rye-grass grew well also. This proved that the land would grow vegetation, but otherwise the experiment failed, as an extra high tide came on, which broke away the wall.

Shortly afterwards I sold the place, and nothing further was done. In a new place that I then occupied I tackled about 100 acres, digging one ditch only, this being on the inside of the wall. I decided against double ditches for two reasons: firstly, that when once the ditches were dug it was final, and the wall could not be increased in size even if found necessary; secondly, the existing vegetation (mangroves, &c.) being left undisturbed, all drifting rubbish was caught and detained, thus adding to the strength of the wall. This ditch was about 6 ft. wide and 4 ft. deep, varying in depth according to the lie of the ground, and acting as a drain for the land, a similar flood-gate being put in as before.

In about a year weeds (thistles, fleabane, &c.) began to grow. I then sowed some mixed grasses and clovers. The clovers grew well in places, and the grass moderately; but it was always near the sides of the old creeks that the vegetation first took, this being probably due to better drainage. I believe that within three years the saltest swamps

could be brought into profit. Fleabane grows very soon, and is capital fodder for cows. If done on a large scale (100 acres and upwards) an expeditious method of making the wall and ditch would be by means of a small bucket dredge working on a pontoon or barge.

THE RAUPO AND RUAWAI SWAMP LANDS.

The writer also made an inspection of the Raupo and Ruawai reclaimed salt-swamp lands on the left bank of the Northern Wairoa River—peaty areas originally covered with raupo, toetoe, flax, &c. In this case large drainage-works have been carried out by a Drainage Board under Government supervision. Some of the main drains are from 18 ft. to 22 ft. wide at the top, sloping to 7½ ft. at bottom. The making of these drains by contract cost 1s. 4d. per square yard. All material taken from the drains was shifted back at least 10 ft. to 12 ft. from the edge of the drain to form a stop-bank. When the banks were formed they were immediately grassed with buffalo and tall-oat grasses, as at Parakai, to prevent the high tide from encroaching and washing the banks away. Flood-gates are here very carefully erected, and are made of concrete, this type being approved by the Drainage Board as against wooden gates. The latter are apt to allow the water to percolate through, and are not so lasting as the concrete gates.

When the land on these areas is properly drained it becomes consolidated after about five years, and the salt by this time is pretty well washed out of the soil by rain. The land can then be surface-sown with English grasses. The fleabane disappears and makes room for the better pasture. I was informed that the fleabane was regarded as a blessing by the farmers. Hundreds of cattle were fattened on fleabane when first the land was drained, and at that stage it was preferable to any English grasses. Fleabane is now pretty well becoming a thing of the past in these swamp lands, and only very small patches of it are to be seen.

Two flood-gates are usually put on the large drains. Wing-walls are put in to assist and strengthen the stop-banks where the flood-gates are situated.

The reclamation of these areas, I was told, cost from £1 to £1 5s. per acre. Some sections sold before the war at £40 to £50 per acre for dairying purposes. Considerable damage was done last winter by high tides and floods, which were more than the protective works could contend with. The salt-water running over some splendid paddocks left them very brown. These works have since been improved and strengthened by a new stop-bank. Although the settlements have a front to the Northern Wairoa, the drainage is mainly towards a river at the back connected with the Otamatea branch of Kaipara Harbour.

CERTIFICATE-OF-RECORD TESTING.

NOVEMBER LIST OF COWS.

W. M. SINGLETON, Assistant Director, Dairy Division.

WORK for November in connection with the testing of purebred dairy cows has been fairly strenuous, and herewith is presented a list of names of qualified cows and heifers numbering over fifty. This, following on a fairly large list published in last month's *Journal*, tends to indicate the satisfactory position of this activity at a time when labour conditions are so far from normal. But the importance of the work is such, we believe, that these lists should be even greater. They do not represent a sufficiently large proportion of our purebred dairy cows throughout New Zealand, even though it be admitted that the breeding of purebred dairy cattle is in its infancy. The increase under present conditions is gratifying, however, and bespeaks a larger patronage when peace conditions obtain.

Only one new class-leader appears in the present list. Mr. F. Mills's cow Alexandra of Waipapa has made a new record for the class of mature Ayrshires. She is now the leader of the two oldest classes, and New Zealand's highest-record Ayrshire as well. It is a great loss to the breed that owing to Mr. Mills, jun., going to the war the testing of their purebred Ayrshires must be discontinued in the meantime. Mr. F. Mills's work during recent years in popularizing the breed is perhaps second to none in New Zealand.

The Friesian cow Friesland Tirania has raised her previous record very considerably. Her first record was of outstanding merit at 508·35 lb. fat, commencing under two years of age. She now adds one more to the list of 700 lb. butter-fat cows.

Monavale Ruby Paxton, bred and tested by Mr. C. C. Buckland, has produced a creditable record in yielding some 232 lb. butter-fat above her requirement for certificate. Two other good records are those of Buttercup III of Kokatau and Lydia Canary de Kol.

Amongst the Jerseys the work of Floss V attracts notice. Six-hundred-pound butter-fat records are not so common but that they will command attention for some considerable time in the future. Athena, with 220 lb. fat over her requirement, has gained one of our best certificates for the month. In the youngest class Mountain

FLORA II.

Owned by Mr. J. G. Harkness; age, 14–15 years. C.O.R.: Days in milk, 323; milk, 6 303·8 lb.; fat 381·96 lb.

WAIRUNA CLOVER.

Owned by Mr. R. Colee, Greendale, Canterbury. C.O.R.: Standard, 350 lb. fat. Days in milk, 348; milk, 15,535·6 lb.; fat, 572·6 lb.

View's May, purchased at the sale of R. J. Linn over a year since, has done credit to her breeder, and to Mr. Sutton, who tested her. Her yield represents some 230 lb. butter-fat over her standard. Swastika, with 220 lb. over her requirement, proves herself to be of a good strain. Mere, our New Zealand champion heifer, might easily have a poorer herd-mate.

The milking-Shorthorns include a 500 lb. butter-fat cow this month. Princess of Dungiven has put up a good record. Some other Shorthorn records from the Ruakura Farm of Instruction might have been included in this list, but will appear later when the farm's list will be more complete for the season.

LIST OF RECORDS TO 30TH NOVEMBER, 1917.

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.					
Junior Two-year-old.		Yrs.dys.	lb.		lb.	lb.
Mountain View's May	J. W. Odgers, Mangamutu	2 35	244·0	365	7,492·60	473·95
Swastika	F. S. McRae, Palmerston North	1 325	240·5	316	7,806·40	460·38
Waiwetu's Trump's Lily	C. W. Reube, New Plymouth	2 77	248·2	365	8,564·00	420·82
Molina's Gipsy Maid	Wren Bros., Tokaora, Hawera	1 348	240·5	365	7,128·10	411·59
Signorina	R. F. Wilkinson, Pukekohe	2 42	244·7	365	7,158·00	404·54
Collingwood's Bright Eye	J. H. Prosser, Leeston	2 20	242·5	310	5,942·00	379·51
Mable's Chase ..	W. J. Hall, Matatoke	2 10	241·5	365	6,617·10	363·17
Meadowvale Goldsize	E. O'Sullivan and Sons, Cardi f	2 8	241·3	365	6,547·10	362·93
Korokoro Jewel ..	R. W. Southee, Colyton	2 49	245·4	365	6,583·50	345·74
Belvedere Bilberry's Flower	E. Eagle, jun., Carterton	2 13	241·8	353	5,836·50	343·23
Belvedere Briar Flower	Ditto ..	2 6	241·1	361	5,780·60	340·37
Grand Lady	Estate of H. B. Curtis (deceased), Inglewood	1 361	240·5	365	5,126·70	321·49
Bloom's Beauty ..	H. L. Spence, New Plymouth	2 16	242·1	355	5,456·40	320·99
Miro Meadows Flossy	H. Wells, Onaero ..	2 10	241·5	345	4,495·30	286·20
Sinecure	Estate of H. B. Curtis (deceased), Inglewood	1 306	240·5	335	3,950·40	261·93
Sunray's Sunlight ..	G. Bottomley, Pahiatua	2 64	246·9	319	4,913·50	247·53
Senior Two-year-old.						
Queen of the Dairy ..	S. R. Lancaster, Palmerston North	2 339	274·4	320	5,494·00	330·91
Junior Three-year-old.						
Yankee's Ruby ..	Estate of H. B. Curtis (deceased), Inglewood	3 18	278·8	360	6,389·90	398·76
Crystal Starlight's Chase	W. J. Hall, Matatoke	3 13	278·3	324	6,891·30	374·60
Belvedere Thistleflower	E. Eagle, jun., Carterton	3 8	277·8	365	6,648·20	365·51

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat
		JERSEYS—*continued.*				
Senior Three-year-old.		Yrs. dys.	lb.		lb.	lb.
Pencarrow's Lady ..	W. J. Hall, Matatoke	3 348	311·8	329	7,020·30	354·93
Junior Four-year-old.						
Miss Fox III ..	H. J. Lancaster, Glen Oroua	4 37	317·2	292	7,391·30	362·52
Senior Four-year-old.						
Northcote Lily ..	T. Brownlee, Pukekohe	4 303	343·8	364	8,692·70	463·06
Carnation's Nanette	F. E. Day, Tamahere	4 355	349·0	354	8,980·70	426·41
Miss Atene ..	G. Rae McKenzie, Carnarvon	4 284	341·9	344	6,720·40	369·73
Mature.						
Floss V	Mrs. A. Banks and Son, Kiwitea	6 8	350·0	364	13,807·90	621·40
Athena	C. W. Ruebe, New Plymouth	5 108	350·0	365	11,948·25	570·63
Fox's Patch II ..	S. R. Lancaster, Palmerston North	5 56	350·0	332	8,313·00	473·40
Queen Regnant ..	A. Buchanan, Palmerston North	5 201	350·0	365	7,809·20	450·05
Dominion Lovely's Gem	A. E. Missen, Rototuna	6 257	350·0	323	7,991·40	439·60
Silvered Star ..	Estate of H. B. Curtis (deceased), Inglewood	10 306	350·0	365	8,957·20	438·39
Shining Star ..	Ditto	6 11	350·0	365	8,700·90	420·33
Senorita	S. Bowker, Shannon..	8 42	350·0	310	6,853·50	403·49
Tiny's Jewel ..	H. L. Spence, New Plymouth	5 54	350·0	348	7,072·50	401·93
Butter Legs ..	Estate of H. B. Curtis (deceased), Inglewood	5 355	350·0	365	7,633·00	400·98
Famous Princess ..	G. Rae McKenzie, Carnarvon	6 305	350·0	354	6,876·00	370·67
		FRIESIANS.				
Junior Two-year-old.						
Monavale Ruby Paxton	C. C. Buckland, Cambridge	1 348	240·5	365	13,502·60	472·33
Manor Beets de Kol..	Hicks and Dibble, Patea	2 26	243·1	365	12,542·50	450·93
Monavale Viola Paxton	C. C. Buckland, Cambridge	2 28	243·3	365	8,390·00	278·78
Belle Piebe of Ashlynn	Brentwood Farm Company, Wellington	1 169	240·5	289	6,975·30	261·75
Senior Three-year-old.						
Friesland Tirania ..	R. K. Macdonald, Edendale	3 358	312·8	365	21,007·55	706·55
Junior Four-year-old.						
Burkeyje Beets Posch	H. North and Sons, Omimi	4 147	328·2	364	14,266·40	460·76
Mature.						
Buttercup III of Kokatau	Cluny Friesian Farm Company, Wellington	6 3	350·0	365	14,929·30	562·81
Lydia Canary de Kol	C. C. Buckland, Cambridge	5 11	350·0	365	16,382·70	539·12
Laddie's Queen	W. McKenzie, Palmerston North	6 14	350·0	198	12,115·00	419·82
Bessie Tulliver ..	C. H. Steadman, Waikiekie	*	350·0	275	10,955·50	351·39

* Mature.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		AYRSHIRES.				
		Yrs. dys.	lb.		lb.	lb.
Alexandra of Waipapa	F. Mills, Hawera ..	6 354	350·0	365	14,636·00	582·47
Jessica II of Haydowns	,, ,, ..	5 107	350·0	365	14,257·00	523·33
		SHORTHORNS.				
Princess of Dungiven	W. Brady, Woodville	*	350·0	365	12,573·80	518·03
Scotchie	J. R. Anderson, Tiakitahuna	*	350·0	365	8,781·40	378·12
Cloverlea Fairy C. 4	D. Buick, jun., Palmerston North	4 4	313·9	342	9,400·30	346·11
Kaiwarehou Una ..	D. K. Buchanan, Waikanae	2 240	264·5	328	6,713·00	336·81

*Mature.

POISONING RABBITS WITH STRYCHNINE.

CARROTS AS BAIT.

It is reported by officers of the Department that very successful results are being obtained on some properties in Otago by the use of strychnine and carrots. Under the procedure adopted the rabbits are free-fed for two nights in succession with unpoisoned carrots laid 1 ft. to 3 ft. apart in plough-furrows freshly made. The advisability of liberal free-feeding for at least two nights is emphasized—in fact, it is practically essential to success. The baits in free-feeding should be similar to those which are poisoned, and should be laid in the same way.

If the baits free from poison are well taken the poisoned carrots can be laid the third day. The poisoned baits should be laid from about 18 in. to 6 ft. apart, according to the infested state of the land. It is preferable to lay the poisoned baits in the afternoon, and if rain comes on and the result is spoiled in consequence they should be immediately relaid when the weather is again fine.

The mode of preparing the poison is as follows: To 1 oz. of powdered strychnine add 1 oz. of icing-sugar, and after thoroughly mixing this add one teaspoonful of clear water, again stirring until a paste is formed. When ready to commence laying have your

carrots clean but not washed. Cut the carrot straight across the top, and with an old clean table-knife thinly smear round the top of the carrot with a very little of the poison paste, and immediately commence slicing off the baits so that each bait will have at least a smear of the poison. When all the smeared part is cut from the carrot again apply the paste as before. The baits should be thin, not more than $\frac{1}{8}$ in. thick and about $\frac{3}{4}$ in. across. Note that each bait only requires a very small portion of the poisonous-paste smear.

All stock should be removed before poisoning commences, and if many poisoned baits are left after three or four days they should be gathered up and buried. Poisoned-rabbit carcases should also be buried in order to ensure the safety of dogs.

EXPERIENCE WITH OATS.

The Fields Inspector, Queenstown (Mr. W. Wilson), has had greater success with oats as bait. Reporting on recent rabbit-destruction operations on a property at Arrowtown, Central Otago, he stated,—

On the 5th November I tried cut-up carrots for feeding purposes, and laid them in light plough-furrows. On the morning of the 6th I went over the ground which I had laid with carrots and found that the rabbits had not eaten the baits to any extent. I then decided to try oats and brown sugar. I used 15 lb. oats to 3 lb. sugar, boiling both together until the oats were soft, and then draining off any surplus water. This mixture I laid for four days, and found that the rabbits cleaned up the baits every night. On the 9th and 10th I laid the oats poisoned with strychnine, using 1 oz. strychnine to 20 lb. boiled oats and sugar. On the 10th Rabbiter McNaughton and I picked up 530 dead rabbits, and on the following day another 160-odd, so that all told we got just on seven hundred. There would also be a certain number which would get into the burrows. I feel well satisfied with this result, especially at this time of the year when there is so much grass about. A large number of the old rabbits were does, and heavy in young, so counting these, I dare say we accounted for close on a thousand. We did about 140 acres.

In view of the acute scarcity of tinplates which threatens primary industries using that material for containers for meat, fruit, &c., the Commonwealth Advisory Council of Science and Industry is investigating the question of substitutes by such materials as are available in Australia in large quantities. Experiments have already commenced at Melbourne University.

BUILDING A SHEAF-STACK.

W. DIBBLE, Assistant Agriculturist.

INQUIRIES lately received indicate a demand for practical information on the subject of sheaf-stack building for farmers who have not had much previous experience of grain-crop operations, but are now doing their share in that direction. The following notes are therefore offered for the assistance of those concerned.

Site and Foundation.—For the site of the stack select, if possible, a piece of ground that is raised and yet practically level. A staddle or stand for a round stack is made by sticking a rod or fork in the ground where the stack is intended to be built, then measuring with a tape from the rod, as the centre of the diameter, the distance to the outside of the size of stack it is intended to build. For instance, if the diameter is to be 15 ft. the tape will be 7 ft. 6 in., and walking round with the tape will form a circle 15 ft. in diameter. On this base make the foundation by laying down timber or rough branches covered with loose straw or bracken to a depth of 15 in. to 2 ft., the purpose being to prevent the sheaves of the bottom layer drawing excessive dampness from the ground.

Basal Area.—The basal size of the stack chiefly depends upon the length of the straw in the sheaf. If the average length should be between 4 ft. and 5 ft. a foundation 15 ft. in diameter will do. On the other hand, if the length is from 5 ft. to 6 ft. a base from 16 ft. to 18 ft. in diameter will be required, so that the heart of the stack can be kept in regular condition and well up. Failing this the heart would be raised rather too full and steep to ensure safe building.

Building.—First set up a stook of from two to four sheaves almost perpendicularly in the centre of the staddle. Place other sheaves round this stook, keeping the heads well up, and continue each row by placing the heads above the bands of the preceding sheaves until the circle is completed. If any part is found to be not tight and firm place another sheaf alongside, in order that the first layers shall be compact and uniform throughout. The first layer being completed, the builder then proceeds to place the next row of sheaves on the outside (with his hands or with a fork), putting the sheaves into the hollow of the preceding layers so as to make the work as compact as possible. The second row is then proceeded with,

working to the centre, by placing the butts of the sheaves on the bands of the outside row. The same is done with the next row—that is, the butts of the sheaves are placed on the bands of the preceding row, and the operation is continued in this manner until all the rows are completed. At the same time the heart of the stack is kept well up by adding a few extra sheaves crosswise, if necessary, to allow for sinking, as it is on this the success or failure of the building depends. It not only helps to bind the outer and the other circles, but prevents the rain from getting into the centre of the stack. If when the stack has settled the butts of the outside row are higher than the heads of the sheaves in the stack, this shows that the stack has been badly built, and it will probably take in rain. In consequence, the grain may be spoilt, principally through not keeping the heart of the stack well filled. It is usual to have a lad or man (termed a "crow" in the Old Country) with the builder, for handing and turning the sheaves to him as they are thrown on to the stack. As a rule the builder should not move about when at work on the stack, as in his going to and fro the placed sheaves would become slack, and the result would be inefficient building and probably a collapse of the stack. For this reason also the "crow" should always stand as near the centre of the stack as he conveniently can for the carrying-out of his work.

Height.—A stack 15 ft. in diameter will stand from 11 ft. to 12 ft. in the body, allowing a settlement of from 10 in. to 12 in. before putting on the roof.

Roofing.—Before commencing to roof the stack see that the heart is well up—in fact, extra full. When this has been done start the roof by placing the first row of sheaves with the butts extending fully 3 in. over the previous or last layer of the body. This tends to shed the rain from the body and applies principally when the stack has been built perpendicularly. Some builders prefer to extend each layer slightly while building the body, this making an in-slope from the top to bottom of the body. Either way can be recommended if the work is well done. When building the roof the butt of each sheaf in each row should extend over the band of the preceding sheaf below, the butts being beaten in by the hand to form a slope. When sheaves are well stooked in the paddock a slope is formed at the butt, and in roofing the sheaf can be so placed that this slope is used.

Oblong Stack.—In building an oblong stack the bottom is made in the same way described by laying down timber and placing bracken or straw on top. After the size of the stack is determined

and the dimensions are laid out (a common size is 26 ft. by 12 ft.), begin by making a long stook right up the centre of the whole length; then place the sheaves, layer after layer, as previously described, till the bottom layers are laid right out to the size of the bottom marked out, afterwards proceeding to build the body, layer after layer, as before mentioned. The head of stack is also built in the way previously described. When this is built up to a size that when a sheaf is laid down the heads project over the other side, it is then time to top up. This is generally done by placing sheaves right along the head in a standing position similarly to the making of a long stook. The sheaves are then fixed on by roping or otherwise, so that they will not be blown off by a strong wind.

Trimming.—When stacks are being built there is often a man employed to keep the stack true and upright. He stands on the ground and uses what is termed a beater, made out of ½ in. timber, from 18 in. to 20 in. in length and from 10 in. to 12 in. in width, fastened on to a batten 2 in. by 1 in., from 6 ft. to 8 ft. in length. With this he beats in any projecting sheaves, and so keeps the stack erect and uniform. This allows the builder to go steadily on with his work instead of getting up and down from the stack to see whether it is running up straight or not. When the work is completed and the stack is to stand for a time it is usual to trim all the long and loose straws from the stack with a pair of shears. This gives it a neat and finished appearance.

LIGNITE OR BROWN-COAL ASHES.

A CORRESPONDENT relates bad experience with Homebush and Mount Somers (Canterbury) lignite ashes when applied to the soil locally. The Department's Chemist advises that lignite ashes* contain a considerable amount of sulphate of lime; that applied to the soil in a fresh state they would be poisonous to plants, but that after due exposure to air the poisonous matter would become oxidized, and lime-compounds would remain, and would, of course, be useful. It is conceivable that large quantities of these ashes applied to badly drained clay soil would render it pasty, and that it would set hard when dry. In the same manner lime in quantity added to loam holding a large proportion of water makes mortar, whereas smaller quantities of lime applied to well-drained clay soils helps to break them up. The conclusion arrived at is that in the cases cited by our correspondent lignite ashes in large quantities have been applied to wet clay soils. Moreover, as indicated, such ashes should never be used without sufficient prior exposure to the air.

* An analysis of Kaitangata coal ashes shows 30 per cent. of sulphate of lime.

ORCHARD COVER-CROP EXPERIMENTS FOR MOUTERE HILLS.

A SERIES of orchard cover-crop experiments, designed to afford data on this subject for that important fruitgrowing area, the Moutere Hills, Nelson District, was established last year on the Mahana Estate, Bronte. Details of the scheme and notes on the results of the first year's operations were published in the *Journal* for December, 1916, to which those interested are referred.

The experiments were duly continued during the present year, similar cover-crops having been sown in March and ploughed in during September. No lime or fertilizers were given on this occasion, the ordinary manurial side of the test being left to work on residues of the previous year's applications. The plots, however, had the benefit of the cover-crops turned under in September, 1916, including the control plot 7, described last year as "untreated." For that reason another "untreated" plot was added this year to afford a full check.

The following brief report on the experiment for 1917 has been furnished by Mr. W. C. Hyde, Orchard Instructor, Nelson :—

The crops were ploughed in during the last week in September, when the *clover* had hardly started to grow. No doubt it would have done all right if more time had been given it. *Vetches* gave the best results this year of any of the crops, and surpassed their performance of last year. The crop was best on plot 3 (blood and bone, super, and muriate of potash), where it reached an average height of 14 in. with good foliage; on plot 4 (blood and bone, and super) it was nearly as good. *Lupin, mixed*, was killed out where the ground was wet, after the plants reached about 3 in. in height. Where the ground was dry they did well, growing up to 18 in. high. This crop generally was not as good as last year. *Lupin, white*, was better in every way than the preceding. *Mustard* was a good crop, but had not the foliage of last year; it was best on plots 3 and 4, where it was 3 ft. high and required heavy chains to bury it. *Serradella* had made no growth, but would no doubt do so if left for the summer. *Partridge peas*, while much better than last year, were not a good crop, being patchy and of light growth.

The "untreated" plots gave practically no growth of any kind of crop. The plots dressed with lime only gave decidedly better results than the "untreated," although the growth was less than half that on the manured plots.

The winter was wet and mild, and had a detrimental effect on many of the crops. The success of the vetches was conspicuous; they turned in well, leaving the soil in nice friable condition.

ESTABLISHMENT OF PASPALUM.

A CORRESPONDENT at Waikino, Auckland District, writing towards the end of last month, asked for information as to the proper time of year to lay down a field of paspalum. He had a paddock ready, but owing to paspalum being so slow-growing he required to sow some other grasses with it. He added that the ordinary grasses would not stand the hot weather in his district. The following reply was furnished by the Biologist, Mr. A. H. Cockayne :—

It has long been popularly supposed that paspalum must be sown in the spring or summer in order that the seed may germinate, it having been proved that this grass germinates extremely badly unless sown in hot weather. During the past two years some experiments with paspalum have shown that at least on prepared ploughed land autumn sowing of paspalum gives excellent results. It is quite true that only a fraction of the seed sprouts during the autumn in which it is sown, but in the next spring and summer the seed germinates freely, even when the ground is well covered with other grasses. It may be said that if the majority of the seed remains dormant in the ground so long it is a waste of time to sow in the autumn. This is quite true so far as it goes, but paspalum, whether sown in the autumn or summer, takes several years to establish itself properly.

The question, then, in laying down a paspalum-paddock is what procedure should be adopted so that the land during this period may be profit-bearing. The answer to this is to lay down a temporary-pasture mixture at the time of sowing the paspalum. In many cases, however, the autumn is the best time to lay down temporary pastures, the summers being too hot and dry to establish successfully ordinary grass-mixtures. Also, autumn-sown temporary pastures, by providing an abundance of winter feed soon after being sown, are of more value than late-spring or early-summer sown ones. Under either of these circumstances it is sound policy to establish special paspalum pastures by autumn-sowing the paspalum in conjunction with a temporary-grass mixture. The following mixture is suggested: Italian rye-grass 20 lb., red clover 4 lb., together with from 6 lb. to 10 lb. of paspalum. If cocksfoot happened to be cheap I should also include 4 lb. of this grass. Such a sowing should afford excellent grazing, or both grazing and hay, for two seasons, by which time the paspalum would be established, and the pasture should finally become one consisting entirely of paspalum.

If weather conditions make it immaterial what season of the year the temporary-grass mixture is sown, then it will depend entirely on the requirements of the farmer whether autumn or spring sowing is adopted. In this special case under review it is stated that summer sowing of ordinary grasses is precluded owing to hot and presumably dry conditions. Italian rye-grass, however, has a wide range in its adaptability to be established under either dry or wet conditions, and it is only under extremely arid conditions that it will not germinate well

Unless it is likely to be extremely dry during the summer establishment of paspalum I should certainly advise sowing with Italian rye-grass, omitting the clover and cocksfoot. If Italian rye-grass would be unsuccessful, then none of the ordinary pasture grasses are likely to be of any value when sown in conjunction with the paspalum. In such a case I should be inclined to try combining Sudan grass with the paspalum, using from 15 lb. to 25 lb. of Sudan. Such a sowing would yield immediate summer feed. The Sudan grass would not last more than a year at the outside, and there would be a considerable period left before the paspalum had come into profit. It is, however, quite likely that in the winter following sowing a good deal of self-sown grasses and clovers would make their appearance, and these would help to form a sward until the paspalum was well established.

REPORTS ON LIMESTONE-DEPOSITS.

In the 1917 annual report of the Geological Survey Branch of the Mines Department the Director, Mr. P. G. Morgan, makes the following statement on this subject :—

Early last year it was decided that a detailed report on the limestone-deposits of New Zealand should be prepared by the Geological Survey. The report as planned is to contain, in the first place, general information concerning limestone, its chemical composition and uses in agriculture. Descriptions, brief or moderately detailed according to the amount of information available, of all limestone-deposits examined by members of the Geological Survey staff or mentioned in New Zealand geological literature are to follow. The report will include all analyses of any value, and all available data concerning quality, quantity, and accessibility. It is proposed also to add a chapter on phosphate-deposits, and another on limestone-crushing machinery. Such a report, it is felt, will be of assistance not only to farmers, but also to all who desire information concerning limestone for other than agricultural purposes.

During the past twelve months numerous localities, as mentioned above, have been visited by members of the staff in order to collect information, and data for a lengthy report on New Zealand limestone have now been obtained. Owing, however, to the Director, who was to undertake a considerable portion of the field-work, having been fully employed in the office-work of the Geological Survey and by his duties as Under-Secretary of Mines, and owing to the small staff available, the compilation of the report in a form suitable for publication will necessarily take a considerable time. Some delay in the carrying-out of the general plan has been caused by demands from local bodies and farming associations for special examinations and reports upon limestone-deposits in which they were directly interested. Some of the requests were granted, but the time occupied in the visits made was largely lost so far as the interests of the public as a whole were concerned, for it is believed that at the present time the good of the community can be better served by a report of general interest than by brief and hastily written notes of local value only.

Detailed examinations of limestone-deposits with a view to establishing lime-kilns or lime-crushing plants will, of course, be found necessary in many localities, but these will be as well or better undertaken by the Department of Agriculture, the officers of which possess expert knowledge of the needs of agriculture in the different districts of the Dominion. If work of this kind is to be undertaken by the Geological Survey, then, as implied above, it should not precede but follow the publication of a general report, which will give the greater part of the information desired to all concerned in less time and at less expense than can be expected from a piecemeal method.

It may be mentioned that several local examinations and reports have been made by officers of the Department of Agriculture on the lines indicated by Mr. Morgan. Some of these reports have been published in the *Journal*.

FORESTRY IN NEW ZEALAND.

In a letter written recently by Mr. T. F. Cheeseman, F.L.S., F.Z.S., Curator of the Auckland Museum, to the President of the New Zealand Forestry League, concerning the growth of New Zealand trees and forestry generally, Mr. Cheeseman says,—

The ideas that many people entertain respecting the growth of New Zealand trees are most extraordinary, and have no foundation of fact. The common belief seems to be that the trees of this country have a rate of growth much slower than that of most exotics. Why should our trees behave in a different manner to those of other countries? The very idea is most improbable, especially when it is considered that there are obviously no reasons based on climate or soil. In reality the *average* growth of New Zealand trees, taking them as a whole, is quite equal to the average growth of exotic trees, taking them also as a whole. The kauri and pohutukawa grow faster than the oak and many other Northern Hemisphere trees, while the totara and tanekaha grow quite as fast. That a few exotics can be found, like *Pinus insignis* and some eucalypts, that have a faster rate does not really affect the argument.

As for forestry in New Zealand, I am of opinion that existing State forests should be conserved and treated as State forests are in other countries, where the rule is "once a forest always a forest." The present plan is to destroy a whole forest for the sake of getting out a few mature trees, whereas the aim should be to render the forest self-supporting and capable of yielding a regular output. But, in addition to this, planting on a larger scale should be taken up by the Government immediately after the close of the war; and for such planting there can, of course, be no objection to the use of exotics. The two plans—the scientific treatment of existing forests of native trees, and the planting of new forests of suitable exotics—should be carried on at the same time.

ALGAROBA, CAROB, OR LOCUST BEANS.

A CONSIDERABLE amount of interest has been aroused recently in regard to the trees which produce these beans. A number of letters from correspondents, and articles appearing in print, show conflicting ideas and a general want of accurate knowledge as to what the trees really are. In order to remove all doubt on the subject the Director of the Horticulture Division wrote to the Director of Kew Gardens, asking for information. Below is a verbatim copy of the reply :—

"Algaroba," "Carob," "Locust," and "St. John's Bread" are common names all of which are applied to *Ceratonia siliqua*, a tree 15 ft. to 20 ft. high ; native of southern Europe and the Mediterranean region. It is wild and cultivated in north Africa ; naturalized in certain parts of India ; cultivated in the West Indies, &c. The beans are sold in England as "locusts," and they are an important food for stock.

"Algaroba" is also applied to *Prosopis juliflora* DC., a tree up to 50 ft. in height ; native of the West Indies and Central America. It is also known as "honey-locust," "honey-pod," "Mesquit bean," and "cashaw." The pods are a good food for cattle, horses, and pigs, though death has resulted on occasion after eating damp or undried pods, owing, it has been suggested, to the germination or swelling of the seed in the stomach. They are also an important article of food with the Indians and Mexicans, who grind them into flour for baking purposes.

Parkia biglobosa Benth. and *Parkia filicoides* Benth. are known in West Africa as "locust-bean" ; they are both trees the pods of which are edible.

Gleditschia triacanthos Linn., of the eastern United States, is known is "honey-locust" ; *Robinia pseudacacia* Linn., of the eastern United States, as "locust-tree" ; and *Hymenaea Courbaril* Linn. as "West Indian locust" ; but the pods of these trees are not regarded as being edible.

Enterolobium Saman Prain (*Pithecolobium Saman* Benth.), the "guango" or "rain-tree," a large tree native of tropical America, is grown for the sake of the pods as good fodder for stock in the West Indies, India, &c.

The fowlhouse should be so constructed as to allow the rays of sunshine to penetrate to all parts of the building.

Fresh air in the house is very necessary for poultry stock of all ages, but draught must be avoided.

WORK FOR THE COMING MONTH.

THE ORCHARD.

J. A. CAMPBELL, Assistant Director, Horticulture Division.

THE lot of the New Zealand fruitgrower in most districts during the past two seasons has not been an altogether enviable one. For orcharding purposes the climatic conditions generally prevailing were extremely bad, while the present season, although very much better on the whole, also left very much to be desired at the outset. The previous bad seasons not only affected the fruit crop very detrimentally at the time, but their effect in very largely increasing the crop of fungus diseases is very evident in many orchards this season.

For several seasons prior to 1915 the climatic conditions were such that the control of fungus diseases was a comparatively simple matter. This obtained to such an extent that many orchardists began to take liberties with such diseases, with the result that the nuclei of disease were present more or less throughout the orchard, and outbreaks became general immediately the unfavourable weather set in. Since that time the climatic conditions have in many instances rendered the task of gaining the upper hand of such insidious diseases as black-spot, brown-rot, &c., one of extreme difficulty.

In regard to brown-rot, particularly among stone-fruits, once an orchard becomes impregnated with spores of the fungus and the climatic conditions continue unfavourable to spraying, early cultivation, and other cleansing measures, it appears to be almost impossible to get it under satisfactory control in one season.

As to black-spot, the case is somewhat different. Although at times it is apt to prove a very stubborn enemy, so long as the proper steps are taken it is controllable under any circumstances likely to exist. In this and all other cases of fungus-control, however, the work of pruning, cleaning, and spraying must be thoroughly done.

This subject will be dealt with in detail in ample time to meet the requirements of next season, while the work required to be done in the meantime will be mentioned in connection with the separate diseases.

CURRENT SPRAYING-WORK.

Black-spot.—If the season continues normal, and particularly if the trees are well open to allow the full benefit of the sun's rays, little further damage is likely to result from black-spot. Nevertheless it is always as well to be prepared for a late attack, which often takes place during January or February. Should the state of the weather indicate such an attack, get in early with 3-4-40 bordeaux, or 1–100 to 1–120 lime-sulphur. The former compound is preferable for pears and the latter for apples.

Brown-rot.—Stone-fruits: From now onward the greatest danger to be expected from this disease is just prior to or while the fruit is ripening. During this period keep the fruit covered with a solution of lime-sulphur,

1–125, or atomic sulphur, 8 lb. to 10 lb. to 100 gallons of water. At the same time remove from the tree and destroy all affected fruit daily.

Powdery Mildew.—If this disease is troublesome spray with either lime-sulphur, 1–100 to 1–120, or atomic sulphur, 10 lb. to 100 gallons of water.

Red Mite and Woolly Aphis.—Red-mite alone can be kept well in check by the continual use of lime-sulphur combined with arsenate of lead when spraying for moth; but where it becomes necessary to deal with woolly aphis at the same time a little Black Leaf 40 should be added, or Black Leaf, 1–800, and arsenate of lead alone may be used.

Codlin-moth and Leaf-roller.—The latter half of January and February covers the second dangerous period of attack by the above destructive insects. The second brood of moth, which hatches out far more simultaneously than the first, is then on the wing, and any neglect of spraying, even for a few days, may result in considerable infection taking place. The aim of the grower should be to keep the fruit and foliage covered without fail with a solution of the arsenate-of-lead mixture during this stage. To do this effectually the spray should be applied thoroughly under high pressure at intervals of not more than three weeks. This work can be greatly assisted and the danger of loss from either codlin-moth or leaf-roller is considerably reduced by a systematic thinning of the fruit crop. The universal remedy for chewing-insects is, of course, arsenate of lead, used at the rate of 1½ lb. to 2 lb. (paste) to 50 gallons of water. Arsenate-of-lead powder is practically twice as strong as the paste, therefore half the foregoing weight of powder is sufficient. All pip-fruits should be sprayed a fortnight or less before picking.

Pear-slug.—This chewing-insect is very destructive to the foliage of the pear, cherry, Japanese plum, &c. The appearance, habit, and damage done by the pear-slug soon becomes known to the orchardist. Mature as well as young trees are affected. With the former defoliation, year after year, very seriously affects the vitality of the tree and the quantity and quality of the fruit it bears. But bad as this is the position is even more serious with respect to the young tree. All plants depend upon their foliage for health. Remove any portion of the foliage and the plant will be correspondingly checked. It is on this principle that the summer pruning of vigorous-growing trees to bring about a state favourable for fruit-production is carried out. In this case, however, the work is under the control of the operator and is carried out with discretion. With the young tree the position is quite different. Strong growth is required for the formation of the tree. Although a certain amount of summer work is generally an advantage in directing the growth of such trees, the wholesale destruction of the foliage such as follows a bad attack of pear-slug cannot fail to be highly detrimental. It is quite safe to say that in the past many thousands of young pear-trees have been ruined through annual attacks of slug. With a little care all this could have been avoided, as pear-slug is very easily controlled. One or two sprayings with arsenate of lead during the season will do what is needful. Spray as soon as the slug appears. Watch the trees and repeat the spraying when necessary. The ordinary spraying for codlin-moth will keep bearing trees clean, while half the strength required for moth will be sufficient for non-bearing trees as well as stone-fruits.

CULTIVATION.

Keep weeds down and the surface of the soil loose by frequent use of the cultivator. Do not fail in this direction after rains. Get to work as soon as the soil will allow, otherwise a hard crust will form, thereby increasing the difficulties of subsequent cultivation and the rapid loss of soil-moisture. A well-cultivated orchard is not only pleasing to the eye, but assists materially in disease-control and the development of the fruit crop.

POULTRY-KEEPING.

F. C. BROWN, Chief Poultry Instructor.

DECEMBER is a very trying month for growing poultry stock of all ages; it is therefore essential that they be placed under the most favourable conditions possible, and given every opportunity to thrive. Every means should be taken to provide ample accommodation. Crowded stock can never give the best account of themselves, but with young growing birds the restriction of sleeping and exercising quarters is merely inviting trouble. The successful rearing of young stock depends on numerous details. For instance, during the hot weather good shade is necessary, and in this respect there is no better place for the birds than an orchard.

Cleanliness is another essential, and the later the chicks the greater the need for keeping everything as sweet and clean as possible. An ample supply of clean fresh water is also important. Too many people content themselves with filling the water-fountain every morning, quite overlooking the fact that its holding-capacity is not sufficient for the daily needs of the chickens. Again, it is often left standing in the sun all day—almost as bad a mistake as leaving the water-fountain empty—for the greater part of the time the birds are compelled to drink warm water, a frequent cause of bowel trouble.

Green food is the life of a growing bird at this season of the year, and yet how many fail to provide any at all! Watercress is an excellent green food for poultry stock of all ages. It not only keeps the birds in good health, but, being secured merely for the trouble of collecting it, must necessarily go a long way towards reducing the cost of the food-bill. It is impossible for poultry to do well without a good supply of grit. It should be available to the birds at all times.

On no account should young stock be allowed to run with adult stock. It is useless to expect chickens to do well when placed at such a disadvantage. Not only are the young ones deprived of their full share of food, but by being forced to herd with old stock they are apt to become infested with vermin, which is sufficient in itself to prevent them from thriving.

Above all things, growing chickens require an ample supply of good food. Although the present cost of foodstuffs is high, it is a penny-wise-and-pound-foolish policy to stint the growing bird of its food. A much better way to economize is to cull out some of the adult birds which have practically passed their period of usefulness.

Clean, roomy quarters and a good range, together with liberal feeding, are the chief essentials in developing young stock.

THE SURPLUS COCKERELS.

The heavy cost of production facing the poultry-keeper makes it imperative that every surplus cockerel that has reached a marketable age be drafted out as soon as possible. Even when food is cheap the margin of profit from cockerels is small, but at the present time they may easily be a source of loss unless well managed and marketed at the right age. Usually about 50 per cent. of the birds reared are males, but it is only in exceptional cases that the cockerels are given even decent treatment after they are drafted out from the pullets. True, the main aim in successful poultry-keeping should be the production of eggs, and it is obvious that the pullets must be well done by in order to produce their maximum egg-yield and return the greatest profits. This applies with equal force in the case of cockerels. If any money is to be made out of them they must be managed in the same manner as the pullets.

The chief weakness in the marketing of cockerels at the present time is that too many are kept until they reach a staggy stage—in other words, they pass the age of what is considered a choice table carcase. The best time to market a cockerel is when it is about four months and a half old. Providing they have been well fed and managed up to this age they will be found in good marketable condition. After reaching this age they begin to produce their adult feathers, and, in spite of being given the best food and attention, it is next to impossible to bring them into fair condition again until they have grown beyond the cockerel stage. This should be obvious to any one, as it is impossible for a bird to produce feathers and flesh at the same time.

The wise poultry-keeper sees to it that all his surplus males are marketed at about five months old at the latest. He realizes that the longer they are on the plant after they have come to a marketable age the greater the drain there is on his profits. Usually a well-fed cockerel at about four months and a half old will command a higher price than one of the same breed at double the age. The increased price realized by marketing a bird when it is young and tender is not the only advantage gained. The food-bill is reduced, while more space is available for the more productive birds of the flock, to say nothing of the saving in labour and attendance. Again, when the birds are marketed before the second growth of feathers makes its appearance the plucking process is a much more simple matter, for there are no pen-feathers to worry about. It is always a mistake to send birds to market in a half-starved condition—birds which are merely frames. It should be remembered that it costs less to produce a pound of flesh than a pound of frame, and that the greater the flesh put on the frame the greater will be the demand for the bird and the profit made from it.

If cockerels are to be marketed in a prime condition at a young age the males should be separated from the pullets as soon as the sex can be determined. It is practically impossible to fatten birds when on range and having the company of females. Before cockerels com-

mence to crow they should be placed in confinement in a good clean house, with a run giving opportunity for limited exercise only. The quarters should be arranged in such a way that they will be completely out of the sight of females. Under these conditions, and if given an ample supply of food, the birds will rapidly produce meat.

As to feeding, there are many different mixtures that will give equal results. Once the priming process commences only soft food should be given, and fed sparingly for the first two days; hard grain cannot be digested with the limited amount of exercise. The mash may consist of ground oats, 100 lb.; ground wheat, 50 lb.; maize-meal, 10 lb.; meat-meal, 5 lb.; and salt, 1 lb.; the whole being mixed into a crumbly mass with skim-milk or soup. After the first two days feed three times a day all the birds will eat up clean.

In priming cockerels the cost of production must always be taken into consideration. On the majority of plants an excellent material is at hand for priming purposes—namely, skim-milk. There is nothing better for mixing the mash, while it may also be given in large quantities to drink. Green food is another thing that can be fed in abundance. In skim-milk and green foods such as chaffed lucerne, clover, &c., the farmer has excellent materials for taking the place to a large extent of grain, pollard, and bran, the present high prices of which are reducing the profits from poultry. Green food should be fed separately from the mash, as it is useless to expect a cockerel to put on flesh if it is only provided with an inferior bulk food. The growing of the frame is the most costly part of the business, and the flesh put upon it by good feeding and attention is the only part of the bird which can be looked to for profit.

Keeping the quarters absolutely free from vermin is another important matter which must not be overlooked. Lice are a constant drain on a fowl's vitality, and where these are numerous a bird cannot make the best use of the food it consumes. In these days of high-priced foodstuffs it will pay well to continually fight vermin.

THE APIARY.

E. A. EARP, Apiary Instructor.

RETURNING SWARMS.

SWARMS in January are of little value except as increase for next season, and should be returned to the hives whence they originate if they can be traced. It is a good plan to kill the old queen in the swarm when returning it, at the same time destroying all but two queen-cells in the parent colony. If the hive is cramped an extra super may be given, and with this inducement the colony will usually settle down at once to work.

After-swarms should always be returned to the parent hive. They are easily disposed of even if the beekeeper does not know whence they came. If they are shaken through an excluder into an empty super the virgin queen or queens can easily be picked out as they attempt

to force their way through, and once these are removed the bees will return to their old home. The young queens can then be used to replace poor queens in the apiary. It is an excellent plan to have one or two queen-cages always on hand. The young queens can each be confined in a separate cage, and when the queen to be destroyed is removed the closed cage containing the virgin can be placed on top of the frames and left there for twenty-four hours, during which time she will be fed by the bees in the hive. At the end of twenty-four hours she can be released and allowed to run down into the frame, when she will be accepted by the bees.

VENTILATION.

The matter of ventilating the hives should by now be receiving every attention. Every means should be used to ensure the bees having an abundance of fresh air day and night. All weeds and other obstructions should be removed from the fronts of the hives, and the entrances enlarged as much as possible. In extreme cases the hive-bodies should be raised from the bottom-boards by means of small blocks of wood. On no account should the bees be allowed to cluster outside the hives, and wherever they show a tendency to excessive fanning steps should be at once taken to increase the supply of fresh air to the colonies.

SUPERS.

One of the necessities of a well-regulated apiary is an abundance of supers when the honey-flow is in full swing. Every inducement should be given the bees during the often brief season to gather in every available drop of nectar. No beekeeper with business acumen will allow his bees to loaf or cluster outside the hives for lack of storage room. It is well when adding additional supers to place them between the brood-chamber and the first super, or at least to raise a few frames of honey from the first super into the second when adding the latter.

It should be understood, however, that supering must not be over-done and the bees disheartened by being given too much work at one time. On no account add a second super until the bees are well at work in the first, and in cases where the colonies are only building up well at the beginning of the honey-flow—that is, where a poor colony has been requeened and the new queen's brood has not as yet hatched—it is an excellent plan to tier up with half-stories. Many an apiarist has had a moderate return from a small colony with half-stories, when it is doubtful if any return at all would have been obtained by the use of full-depth supers.

QUEEN-EXCLUDERS.

January is the month when queen-excluders are of most use to the beekeeper, especially in southern districts. Whatever their disadvantage may be in some localities, in the South they have proved their efficacy in enabling the apiarist to finish extracting before the hot weather goes, without the destruction of any brood whatever. They should never be used for general purposes until the main honey-flow is in full swing. By that time the bees are used to working in the supers, and with nectar in abundance to be had all around them they will work cheerfully right through the hive, passing through the holes in the excluders as if no obstruction existed.

The best method of using the excluders is as follows: All sealed brood should be raised above the excluder, and the queen confined below on drawn-out combs. The brood above the excluder should be watched for a few days in case any eggs have been elevated, as the bees will sometimes attempt to raise queen-cells above the excluder. If this happens the queen-cells should be destroyed, as the queens which will emerge from them will not be able to pass through the excluders to get mated, and will in time develop into drone-layers. By providing the queen with plenty of empty combs she will be able to cultivate laying at a sufficient rate to keep up a supply of workers, and as the brood hatches out in the upper stories the cells will be at once filled up with honey.

Excluders are often condemned as being productive of over-swarming, but in many localities swarming ceases automatically as soon as the main honey-flow commences, and if the queen is allowed plenty of room in the brood-chamber, and the brood in the supers carefully watched for the production of queen-cells, very little harm can come from the use of queen-excluders, while the immense advantage of being able to extract combs entirely free of brood is worth a great deal to the apiarist at his busiest season.

USE OF FOUNDATION.

False economy in the use of foundation will lead to the production of endless numbers of drones. If on the score of expense the bee-keeper is only able to buy a limited quantity of foundation, it is by far the best policy to restrict increase and utilize only full sheets in producing good combs. It is the inside of the hive that counts. In many apiaries where good equipment is used the practice of the use of strips and half-sheets of foundation is far too common, and the result is that large numbers of drones are reared annually at the expense of the crop, instead of a profitable force of worker bees being produced. Drones thus produced by bad combs are a tax on the hive until the end of the season. It must be fully realized that drones are consumers and not producers, and whilst it is impossible to prevent their production altogether, even if full sheets of foundation are used, their numbers can be considerably reduced.

It is a difficult matter to educate beginners to the use of full sheets of foundation. Chiefly on the score of expense narrow strips only are used for the purpose of preventing the bees from building cross-wise. The advantages of the use of foundation is that it gives the beekeeper control over the brood-chamber, and, in addition, the bees are saved the energy of bringing in the necessary amount of honey to produce the wax. If we estimate that it takes 1½ lb. of foundation to fit up a hive, that this costs the beekeeper approximately 5s., and that to produce this amount of wax the bees must collect 18 lb. of honey of a value of, say, 9s., it is readily seen that the balance is in favour of the ues of full sheets of foundation.

However carefully the beekeeper may furnish his hives with full sheets of foundation, he will produce sufficient drones to supply his apiary for the season. Because drone-cells require less wax to form and less time to produce, the bees will always build them wherever a gap occurs in the sheet of foundation or wherever a stray corner exists

between the sheet and the frame. From every point of view the production of drone-comb in large quantities is waste. It has been estimated that a square foot of drone cells produced five thousand drones, while the same amount of space would produce eight thousand workers; so that by allowing the bees to build combs to suit themselves we are not only considerably depleting the stock of producers, but are at the same time producing hordes of useless individuals which will absorb the food and the time of the hive without any promise of ultimate return.

Devices are at different times placed before the beekeeping public with a view to economizing the use of foundation and even to eliminate it altogether. There has never yet been devised any successful substitute for full sheets of foundation. The apiarist should at all times aim at getting combs as near perfect as the bees can build them, and these can only be produced by using complete sheets of foundation. Combs composed partially or entirely of drone-brood may be used as extracting-combs, but they can never profitably be placed in the brood-chamber, and in a well-regulated apiary all combs should be interchangeable.

Good drawn-out worker-combs are next to the bees themselves absolutely the best asset the beekeeper has, and their production and care should be arranged for all the year round. Many beekeepers could minimize the cost of their foundation if they would carefully conserve every piece of waste wax which the bees produce. These pieces melted and clarified, together with cuppings and any combs which may be condensed, could during the off season be consigned to any local maker of foundation to be made up and returned to the beekeeper in time for the season. By doing this he would find his foundation bill considerably reduced year by year. But, whatever his methods may be, he must always bear in mind the fact that no beekeeper can be wholly successful who allows his bees to build unlimited drone-comb, and that whatever form his economy may take it should never take that of using half or quarter sheets or strips as starters of foundation.

VITICULTURE.

S. F. ANDERSON, Vine and Wine Instructor.

THE VINEHOUSE.

As January is the month in which the first fruit is ripe in the majority of the cool-houses, little need be said regarding cultivation and training. It is needful, however, to give a reminder of the importance of right treatment of the vine for the period between gathering the fruit and the natural fall of the leaf. Sometimes growers as soon as the fruit is gathered start breaking off the shoots throughout the house, with the mistaken view that the vine having produced and ripened its fruit there is no further call for the foliage, and that light should be let into the house, or it may be to benefit plants put into the house. This

treatment is a great handicap to the vine, for it is by the vigorous growth made during the autumn months that it recuperates and finally develops and ripens its buds for the next season's growth.

THE VINEYARD.

Bearing in mind the remarks in last month's notes on vineyard culture under the present war conditions, there is one line of work which cannot be curtailed—that is, the prevention of mildew by sulphuring, as frequently described in this *Journal*. If mildew is kept well under control up to the end of January the danger from this universal trouble will be practically over, as the grapes will have then attained their full size. Great injury can be done by neglect of the necessary precautions.

CELLAR WORK.

Except in the best cellars where the temperature can be controlled, this hottest period of the year is a trying time for all wines of a low alcoholic strength—whether in cask or bottle—such as hock, chablis, claret, and burgundy. No wines should be racked or bottled at this time except when absolutely necessary—for instance, in case of wine-diseases; neither should delicate wine be sent out. Casks containing this latter class of wine should be visited at least once a fortnight and kept completely full. All wine in casks is liable to ferment on account of the rise in temperature, and requires close watching during these warm months. The proper temperature of the cellar is 60° F., and means to secure that should be studied by the vigneron. If the roof is of iron there are washes known to the trade that give a dead-white surface which, if the roof is coated therewith, lower the temperature considerably. Another plan is an underground drain of some chains in length leading to and with an opening into the wine shed or cellar. This brings in a cool underground draught as the temperature of the cellar rises. Precautions must be taken that the level of the drain is such that water cannot flow in. If the cellar-floor is of concrete some water may be sprinkled about at the hottest periods. The main object should be to maintain as even a temperature as possible.

THE GARDEN.

W. H. TAYLOR, Horticulturist.

VEGETABLE-CULTURE.

DURING the first half of January the garden-cultivator should plant broccoli of mid-season and late varieties. The broccoli are important, as they supply the so-called cauliflowers for winter and early spring use. As they fill the gap between the autumn and spring cauliflowers several sorts should be planted. Cauliflowers of Autumn Giant type planted at the same time will come into use in April and May, and the first broccoli toward the end of May or early June—that is, presuming an early variety has been already planted. Plant also savoys, cabbages,

and varieties of kale. With regard to the kales, they are not suitable for growing except in the cooler parts of the Dominion. They require the influence of frost to make them tender. Another sowing of peas may be made, except in the warmer parts where peas only succeed early in the season. French beans may be sown in all places, also turnips, lettuce, and radish. Silver-beet should be sown towards the end of the month, or it may be left till February, which in most parts will be in time to secure good winter crops.

Leeks.—The most extensive planting of leeks should be made at this time. Planted early in January the digging can commence in May, by which time they will be a fair size. Growth becomes more rapid as the weather becomes cooler. The plants increase in size till the middle of September, then they stand more or less without growth preparatory to going to seed. It may be reckoned that this planting will provide leeks for use during a period of about five months, and it can thus be considered one of the most valuable crops of the year. Many people plant only few leeks because they think they must be planted in trenches which take up a lot of room. That system of planting has been out of date for many years. Plant in rows from 15 in. to 18 in. apart, the former distance in really good soil. Leeks are gross feeders, and if the soil has been liberally treated with stable manure so much the better. To plant, draw a drill as though peas were to be sown, and strew some bonedust and superphosphate along the drill—just enough to show plainly. Set the plants about 9 in. apart in the drills. Use a good dibber made from a spade-handle; thrust it full length into the ground, and give a circular motion to enlarge the hole at the top. Take a plant, which should have a stem 6 in. or more long, and let it down as far as it will go into the hole; now pull it up a few inches so as to straighten the roots; then thrust the dibber into the soil a few inches from the plant with the point slanting towards the hole, and bring the handle over against the plant, closing up the hole and fixing the plant firmly. Only the stem of the plant must be buried; the soil must not enter the heart of the plant. Do not cut the tops off the leaves, and do not cut the roots. After the plants have started to grow give a dressing of nitrate of soda strewn along the drills. One ounce will be sufficient for about 4 yards of drill. When weeds appear the ground should be hoed over. At this time draw in soil to fill the drills, covering weeds in them without hoeing them out. If extra-fine leeks are wanted they may later on be moulded up, first enveloping each leek in a wrapping of paper.

Celery.—It is quite useless to try to grow celery in dry soil. If the soil is naturally good vegetable-growing ground, celery will do without watering after it has got a good start, otherwise it must have abundance of water. Celery-rust, which shows as small rust-coloured dots on the leaves, is very destructive. It cannot be cured once it gets a good hold, but if caught in the early stages spraying with bordeaux will stop it. Scientists say that in the first instance of an outbreak of the disease it is communicated by the seed and in no other way; further, that the spores of the disease die in two years. Therefore if two-year-old seed be used there will be no disease. This is worth remembering for future guidance. The latest planting should be made during January. Advanced crops should be moulded up for blanching.

Moulding up is best done by two persons; one holds the heads together while the other throws in enough soil to hold them in place. Then each take a spade and work on opposite sides of the row. When there is only one pair of hands it is best to tie the heads together, either with a strand of raphia, or, better, by taking strips of paper cut 6 in. wide, winding these around the heads and loosely tying them. Whatever is done the stalks must be kept straight and pressed firmly together, so as to keep the soil out of the hearts of the plants. Soil should be pressed very firmly around the base of the heads so as to prevent sinking after the ridge is made up, as if that occurred it would bend the upper portion of the heads and cause pithy stalks.

Onions.—In places where onion-mildew is prevalent it will be wise to spray the crops before the disease appears. My own experience is that if the disease gets a firm hold before spraying it is best to leave the plants without spraying, for in such cases it does considerable harm. Spraying is effectual if applied as a preventive before the attack. I found 2-2-40 bordeaux the safest strength. Resin-soda solution should be added as an adhesive, as without it the bordeaux is washed off by the first fall of rain. To make resin sticker dissolve 1 lb. washing-soda in 2 gallons of boiling water, add 1½ lb. resin crushed to a powder, and boil till thoroughly dissolved. One gallon of the solution should be added to 40 gallons of bordeaux.

Tomatoes.—Side shoots should be pinched off as soon as they show. Refrain from watering except where the soil is absolutely dry; also refrain from giving liquid manure except where the soil is very poor. It may be that no harm would result from the application of water and liquid manures, but there is considerable risk of setting up disease-attacks, and in any case such help is rarely required.

Cultivation.—Keep the surface soil loose between the growing crops. Frequent disturbances of the soil, besides conserving moisture and bestowing other benefits, is the surest method of keeping in check insect pests, such as woodlice, ants, crickets, &c.

SMALL FRUITS.

Red Currants.—These bear fruit only on spurs, and never on young wood. The aim, therefore, should be to encourage the formation of spurs, and to keep the bushes open so that light may reach every part of the bush. At this time the bushes will be crowded with young wood. All side shoots should be cut back to about 6 in. In winter they must be still further shortened, but now not further than stated. If the leading branches are top-heavy they may be shortened somewhat to relieve them of weight, which may bend them out of shape or even cause them to be broken off by wind. Remove entirely any gross shoots that may be springing from the lower parts of a bush which are not wanted and shut out light.

Black Currants bear next year on wood made this year, therefore the young shoots must not be shortened. They also bear on spurs on older wood. An open centre is not desirable with these bushes, but crowding should be avoided. There is a tendency to crowd by the throwing-up of a number of strong shoots from the base, and if too numerous these should be thinned out.

Gooseberries bear fruit on young wood and on spurs with equal freedom. This habit enables the bushes to conform to quite distinct methods

of training, all of which give good results, but are not adapted to all conditions. In the South Island the bushes succeed when trained to an open cup shape with close spurred branches, a system largely adopted in England, where the climate closely resembles that of our South Island. In the North Island this system does not answer, and I have seen whole plantations killed outright by close pruning, which is accompanied by summer pruning also. In the North Island it is best not to shorten the shoots in summer. The bushes should be kept open by not having too many branches, and strong shoots springing from the centre or base of the bushes should be torn out now. Let alone the remainder of the shoots at present.

Raspberries.—Suckers should be kept under by cultivation, hoeing, or whatever methods suits the case. None should be allowed far out from the stools. Between the stools the suckers should not be allowed to form a thicket; in fact, if they are not required for new plantations all should be suppressed, except, of course, those in each stool that will be needed to replace the canes now fruiting. The new canes will develop better for not being crowded.

Strawberries.—Where mulching has not been resorted to the surface soil should be kept loose by very shallow cultivation. Strawberries are naturally shallow rooters, and frequently there is no great depth of good soil. In any case the roots should have possession of as much of the top spit as possible. To preserve moisture a good mulch is better than cultivation. It has the effect of making the whole of the top soil available to the roots of the plants, and enables the worker to tread between the rows without hardening the surface. Where runners are to be saved it is best to root them in alternate rows in sufficient number to provide the plants required. These rows should not be mulched, and there will be no necessity for walking in them.

Cape Gooseberries require no attention at this time other than keeping the surface soil loose and clean. The plants are to be left to make growth in their own way.

Loganberries.—It is best to renew the rods of these every year, therefore take care to preserve a sufficient number of the new rods now being made to replace those now bearing, which latter should be cut away when they cease fruiting. This is better than leaving them till winter, as their removal gives more room and light to further the development of the new rods, resulting in better crops the next season.

Silver-blight.—The Horticultural Overseer at Ruakura reports that the sulphate-of-iron treatment applied to affected peaches and nectarines has not been generally successful. The Sneed variety of peach, however, which was quite the worst-affected tree last year, is this season carrying decidedly healthier foliage than the average. This tree received the heaviest dressing of any comprised in the experiment—namely, 7 lb. of iron sulphate, followed by a second application of 5 lb.—in the past early spring. It may be added that this experience as a whole coincides with that of the Horticulture Division. Although the use of a strong fertilizer, such as sulphate of ammonia or iron, is beneficial, and has in many instances apparently effected a cure, the treatment can by no means be relied on as a remedy for silver-blight.

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in the *Journal* must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

RESTORING CUD IN COWS.

B. LAWSON, Canvastown :—

Kindly advise me as to the best means of restoring the cud in a cow. One of my cows lost her cud about six weeks ago, and I have tried different remedies in the way of drenches, but so far without success.

The Live-stock Division :—

Drenches are often of little avail in restoring the cud in a cow. Something more stimulating is required. You should try the following treatment: Get a quantity of beer, and give the cow three large bottles per day, and more if she will stand it. This treatment has been found very successful.

COWS AND TESTING.

P. P., Matainui :—

Is it usual for cows newly calved to have a very high test, and to go back, say, five or six points within ten days ?

The Dairy Division :—

The conditions stated in your question can scarcely be termed usual. Our testing indicates, however, that if cows are in a fairly fleshy condition at calving, and are heavy producers of milk and butter-fat, the test taken for the first or second month is generally the highest for the first half of the lactation period. With such cows each succeeding month's test tends to indicate a receding percentage of butter-fat until the minimum is reached. After this a gradual increase may be usually expected. If cows are in low condition at calving there is no stored-up fat to be drawn upon during the earlier portion of the milking-period, and consequently a lower test may then be expected. It is evident, therefore, that the only test likely to fairly indicate a cow's capacity as a producer must extend over the full milking-period, and that the cow must be at least in fair condition when commencing her season's work.

SILVER-BLIGHT ON APPLE-TREES.

G. FIELD, Tasman :—

Kindly inform me in regard to the cause and remedy, if any, of silver-blight on apple-trees. Last year I grafted Delicious on to three- and four-year-old Shepherd Perfection trees. After the grafts had taken well and growths of about 12 in. had formed they gradually turned silvery, and the whole tree died. This year a few more are turning the same way, after forming nice clean foliage this season.

The Horticulture Division :—

It is a common experience, particularly in your district, for regrafted trees to die with silver-blight. The disease is not well understood, and is a puzzle in all parts of the world. It is generally admitted to be a wound parasite, and painting the scars made by cutting off the limbs has apparently resulted in saving the trees in other districts. Beyond this no remedy is known. The scars should be painted over as soon as the scions have taken, using white-lead and oil as a paint. Grafting-wax is not effectual as a covering, as the edges are lifted by the sap in the wood and bark of the trees.

ARSENICAL SPRAY FOR GORSE.

H. J. PORTER, Fernhill :—

I would like to know whether there is any spraying-mixture that would kill young gorse after burning the standing gorse.

The Fields Division :—

A mixture which can be home-made, and which has proved effective when applied to gorse, is 3 lb. crude arsenic and 2 lb. caustic soda dissolved by boiling in 3 gallons of water. For spraying use 1 gallon of the mixture to 10 gallons of water. As it is poisonous, stock should be kept off for ten or twelve days after applying.

SORREL AND SURFACE SOWING OF HILLY TUSSOCK COUNTRY.

"SORREL," Methven :—

We sent some white-clover seed to be cleaned, and have had returned to us 400 lb. of sorrel-seed with a sprinkling of at least 5 per cent. of clover, cow-grass, and alsike. Would it be wise to sow this on hilly tussock country for the sake of the clover, &c., in it, or would the sorrel grow and stay in the land (which, of course, is never under the plough) ?

The Biologist :—

The sowing of sorrel-seed under any circumstances is not advisable. In the past clover cleanings such as you describe have been used on dry gravel river-terraces containing little if any actual soil ; but even this practice is rarely adopted now. Poor tussock country generally contains a good deal of sorrel ; and if the farmer really believes that the further addition of sorrel would be beneficial, then its sowing might be entertained. So far as the clover in the cleanings is concerned, neither the alsike nor the cow-grass is likely to be a success on the type of ground mentioned, and an examination of the other clover present would most likely show that it consisted mainly of suckling. Surface-sowing of southern tussock land is very often unsuccessful, but whenever attempted I should certainly advise the sowing of a mixture of grasses on a late summer burn, using cocksfoot, danthonia, and crested dogstail as the main constituents, with perhaps a little rye-grass to secure rapid feed.

MAKING LUCERNE-MEAL FOR POULTRY.

E. B. IZARD, Stoke :—

In the poultry notes of the September *Journal* it is stated, regarding lucerne for poultry, that where the necessary appliances are available it can be ground into meal and can wholly take the place of pollard. I would ask you to inform me what constitute the "necessary appliances," and whether some small hand-machine is procurable, or how the meal is produced.

The Chief Poultry Instructor :—

We know of no hand-machine suitable for the purpose. The method adopted to produce lucerne-meal at the Milton Poultry-station is to finely chaff well-cured lucerne hay, and then to put the chaff through a No. 3 Wilson farm mill. This mill is driven by a 4 h.p. oil-engine, and is especially made for the grinding of grit and grains. It could not be recommended for grinding lucerne on commercial lines. There is a machine now made in America which will chaff the lucerne hay and grind it into meal in one handling. Particulars of this appliance may be obtained from the selling agents, Oliver Williams, 268 Market Street, San Francisco.

PROTRUSION OF BACK PASSAGE IN PIG.

"SUBSCRIBER," Otekaieke :—

I have a pig (a barrow) whose back passage has come out. It is about the size of a hen's egg, and he keeps scratching it against the sty, which causes it to bleed. The pig seems to be in good health otherwise. Could you tell me the cure, if any ?

The Live-stock Division :—

There is very little you can do to relieve the animal. You can try, however, washing the part well with warm water and soap, then pushing it back until it is inside; but it is sure to come out again before finally remaining in. If you fail to reduce the part, just leave it alone, as nature effects a cure in such cases, and the projecting part will slough off.

SUDAN GRASS.

"GARDENER," Takapuna :—

May I ask you to tell me whether Sudan grass is a perennial, also its botanical name, and where it comes from.

The Fields Division :—

Sudan grass (*Andropogon halepensis*, variety Garawi) is an annual variety of sorghum recently imported into New Zealand and originally obtained in the Sudan by officers of the United States Department of Agriculture. A variety of Andropogon without the undesirable underground rootstocks was desired as a forage plant for the warmer and drier parts of the United States, and the Garawi was sent to Washington by the Director of Agriculture for the Sudan Government at Khartoum.

DROPPING OF BUDS IN PEACH-TREES.

WALTER J. BRIGHT, Hawera :—

Please explain, if possible, why my peach-trees, four or five years old, do not bloom. At pruning-time they were abundantly supplied with fruit-buds, which, however, instead of bursting into blossoms, loosened and fell off just as the trees began to "move" in the spring. A very few of the weaker buds bloomed and have set into fruit, but quite 95 per cent., especially the strong plump ones, fell off in the manner mentioned. The Taranaki soil is light and volcanic. The trees were lightly dug round in winter. Last year the same thing happened, although the trees were young and not quite so plentifully supplied with fruit-buds.

The Horticulture Division :—

Peach-trees dropping their buds is not an uncommon occurrence, though it is not usual for them to lose such a large proportion. The reason for the falling-off of the buds is somewhat obscure, but it is now attributed to the trees having suffered from want of sufficient soil-moisture during the previous autumn. The only practicable way to overcome the trouble is by keeping the ground free of weeds and the surface soil loose, or possibly heavy mulching. In America irrigation has been found beneficial. Early varieties such as Briggs's Red May, Alexander, Sneed, Saunders, and others suffer most. Later varieties are but little affected. It is suggested that you would do well to bud your trees with later varieties, such as Paragon, Wiggins, Hales, Mamie Ross, Carman, Muir, or varieties of like season.

LICE IN HORSES.

R. H. T., Otane :—

Each year some of my draught horses become infested with a large kind of louse. The horses are usually in work, groomed, and well kept. I have tried kerosene and dip, but it does not rid them of the pest. When they are clipped the lice seek refuge in the long hair of the legs. Will you kindly advise a remedy.

The Live-stock Division :—

Lice in horses are sometimes difficult to get rid of, but a successful procedure is to have the animals clipped, and at the same time dress any parts unclipped with a dressing of fish-oil, 8 parts, and petroleum, 1 part. Rub this well into the roots of the hair. Any animal with its short summer coat can be thus treated all over. It is also necessary to disinfect any horse-covers or rugs. This is easily done by placing them in sheep-dip for a few hours, then hanging them upon a fence to dry.

RAISING HOLLY-PLANTS.

J. MATHEWS, Tokirima :—

Could you inform me if holly-seed can be raised to plant out this season, and, if so, the best kind of seed and time to sow, and the treatment of ground.

The Horticulture Division :—

Holly-seed could not be raised to plant out this season. Holly-seeds usually take two seasons to germinate: that is to say, if they were sown next autumn or spring they would most likely not come up till a year later. They would then most likely take two years more to reach a size fit for planting out. The berries may be buried in the ground in soil that is well drained and not too wet, and kept there till next spring; then sow in rows in well-dug ground in drills made about 1 in. deep. The best kind of seed would be berries taken from a good type of tree.

SORE ON COW'S TEAT.

"INQUIRER," Waikato :—

I have a cow in my herd which has developed a hard black sore (not running) on one of her teats, and it is spreading right round the teat about half-way down. Could you inform me of the best treatment? I am milking by machine, and am afraid of the trouble spreading to the rest of the herd. At present I am hand-milking this teat, as I found the machine would not take the milk from it.

The Live-stock Division :—

We recommend you to apply glycerine to the sore, then next day paint it with tincture of iodine. This can be repeated in three days' time if necessary. At the same time you should isolate the animal so as to take no risks of infecting the other cows, and also see that the milker's hands are disinfected after every milking.

ANTS IN LAWNS.

W., New Plymouth :—

During the last five years ants in tennis and other lawns have been very noticeable in the district, and have now become a very serious pest. In a lawn we have there are hundreds of ants' nests observable by slight indentations on the surface when walking over the grass. Upon cutting the sward with a sharp knife there is found quite an underground cavern with thousands of black ants and their eggs. These holes sometimes extend downward 6 in. to 10 in., with diameter varying from 2 in. to 4 in. Lime has been tried as a top-dressing, but without effect, and at present these are being treated with hot water when found opened. This is apparently a cure, but a big undertaking. I think possibly some strong dressing in the winter might destroy them. Can you advise a remedy?

THE Horticulture Division :—

The following methods have proved successful in clearing lawns of ants: (1) Top-dressing with Peruvian guano; it would probably be best to give several dressings, each 4 oz. per square yard, in preference to one heavier dressing; the guano would, of course, promote the growth of the grass. (2.) Boiling water in which camphor has been dissolved. (3.) Large flower-pots inverted over the nests, the hole in the pot being stopped up; the ants come up into the pot, which can be lifted with a shovel and placed in water.

War regulations gazetted on 19th November, 1917, decreed that it shall not be lawful for any person to sell or agree to offer to sell, whether as principal, agent, or otherwise, any lamb-pelts produced in New Zealand otherwise than to His Majesty, or for delivery by the seller to the purchaser in the United Kingdom, or for delivery by the seller on board a ship in New Zealand for direct carriage to the United Kingdom, or with the precedent approval of the Controller of the Department of Imperial Supplies. For the purpose of the regulations "lamb" means a sheep under the age of twelve months.

PURCHASE OF WOOL, SHEEP-SKINS, AND HIDES BY THE IMPERIAL GOVERNMENT.

(Contributed by the Department of Imperial Government Supplies.)

THE intention of these notes is to put briefly before farmers and stockowners the salient features of the rules governing the purchase in New Zealand by the Imperial Government of the three products, wool, sheep-skins, and hides. The organization controlling this work, together with the purchase of frozen meat, butter, cheese, &c., is the Department of Imperial Government Supplies, under the direction of the Right Hon. the Prime Minister.

WOOL.

All wool grown in New Zealand is requisitioned on behalf of the Imperial Government to more effectively provide for the necessities in respect of the war, and it is unlawful for any person to sell or offer to sell, or for any person to purchase or offer to purchase, wool save by way of sale to or purchase from the Crown.

As an exception, provision is made for the issue, by the Controller, of dealers' licenses, by which certain persons, who had previously gained their livelihood by purchasing small lots of wool, skins, &c., from farmers, may purchase oddments of wool up to not more than 800 lb. from any one grower. Such purchases must afterwards, however, be submitted for valuation and purchase by the Government through a registered Government broker. Farmers selling oddments of wool to dealers should in all cases insist on seeing the dealer's license.

RANGE OF VALUES.

The price at which the Imperial Government agreed to purchase greasy and scoured wool from New Zealand growers is 55 per cent. above the average prices realized in New Zealand for the 1913–14 clip. The following scale of descriptions and values was taken to represent the average returns of New Zealand wool sold during the season 1913–14:—

Description of Wool.	Range of Values per Pound according to Quality.
Superior merino combing	From 12d. to 14½d.
Medium to good merino	,, 9¾d. ,, 11½d.
Inferior merino	,, 8½d. ,, 9½d.
Superior half-bred	,, 12d. ,, 14d.
Medium to good half-bred	,, 9¾d. ,, 12d.
Inferior half-bred	,, 9d. ,, 10d.
Superior crossbred	,, 10½d. ,, 12d.
Medium to good crossbred	,, 9d. ,, 11d.
Inferior crossbred	,, 7¾d. ,, 9d.
Lincoln and Leicester	,, 8¾d. ,, 10½d.
Lambs, good	,, 11d. ,, 13d.
Lambs, medium	,, 9d. ,, 10¾d.

To these values, as indicated, an addition of 55 per cent. is made, and the total is the Imperial Government rate of purchase.

Inferior classes of wool, such as inferior lambs' wool, black, dead, pieces, bellies, locks, crutchings, seedy, or other faulty wool, are valued at proportionate prices. Extra super wool is also valued at proportionately higher prices.

The value placed on the wool is the net cash price at which the Government purchases the wool delivered in a shipping condition at a registered Government broker's store at any of the valuing centres in New Zealand, all charges for store handling, cataloguing, displaying for valuation, invoicing, &c., and placing f.o.b. ocean steamer being borne by the Imperial Government.

Fourteen days after valuation payment is made, free of exchange, to the broker in whose possession the wool is held, and the broker receives and accounts for same as the agent of the grower.

VALUATION.

Prior to the requisition of wool, public auction sales of wool, attended by overseas buyers, were held only at the main centres. To meet the convenience of growers the Government established valuation centres at the following places: Auckland, Tokomaru Bay, Tolaga Bay, Gisborne, Napier, Waitara, Wanganui, Wellington, Nelson, Blenheim, Christchurch, Timaru, Oamaru, Dunedin, and Invercargill.

Expert wool-buyers, overseas and local, were appointed to make the necessary valuations. They are arranged in five groups, stationed respectively at Auckland, Napier, Wellington, Christchurch, and Dunedin, each group under a Supervising Wool-valuer.

For the purpose of estimating the exact value of each grade and quality of wool the schedule of greasy values is extended to its equivalent when clean-scoured, and the wool is valued according to its grade, quality, and yield on this basis; consequently all classes of wool, from the highest to the lowest grade, are valued at their fair proportionate prices.

Provision is made, if the owner is dissatisfied with the valuation placed on his wool, for him to appeal within forty-eight hours (extended to seventy-two hours on good cause being shown) to an umpire nominated by wool-growers. A fee is payable before adjudication, to deter frivolous and useless appeals, and the fee is returned if the appeal is upheld. The number of appeals made during last season was an infinitesimal proportion of the lots valued.

CLASSIFICATION.

Wool is classified by the wool-valuers according to its "quality number" or "counts," and according to its grade of AA, A, B, C, or D in that quality number, and the valuation varies similarly. The "get up" of the wool is a very large factor in deciding the grade in which a lot shall be placed. For example, no wool which is unskirted can be placed in either of the two top grades—AA (extra super) or A (super)—however choice it may be, so far as being bright, well grown, and of good colour or condition. The fleece should not, however, be too heavily skirted to the extent of taking off clean body-wool. All dirt, stained ends, and short wool should be removed, and the fleece rolled in the approved manner from breech to shoulder.

Wool should be classed by the grower as closely to qualities as is reasonable, according to the size of the clip. In very small clips blending of fleeces is necessary to get full bales, but an endeavour should be made to at least keep separate coarse (36's to 40's), medium (44's to 46's), fine (48's to 50's), cotts, merino, bellies, pieces, and locks.

It is safe to say that at no time in the history of New Zealand wool-sales has the "get up" and condition of a clip been so sure of getting its full return. The accidents of competition or want of competition being removed, each lot is valued at its strict relative value on a scientific basis, and there is no inducement to the valuers to appraise at other than a fair and just valuation as between the grower and the Imperial Government.

BALING AND BRANDING.

Wool must be branded on one end only (preferably the cap end) and on one side only with the farmer's brand and number in figures not less than 3 in. in height. This is necessary to ensure clean surfaces for the shipping countermarks. Particulars of the contents, if stencilled on the bale, must be placed on the same end and side as the brand and number.

Bags and fadges of wool are not valued until repacked in a shipping condition, and brokers are authorized to make a charge against the seller of ¼d. per pound for the extra work involved, in addition to the cost of woolpacks, if supplied.

DISPOSAL OF WOOL AFTER PURCHASE.

All New Zealand woollen-mills are allowed to select the wools they require for their trade at cost price.

Wool for shipment is countermarked, dumped, and stacked, and held on behalf of the Imperial Government until shipping is available.

Wool for scouring is allotted to wool-scourers, to be sorted and scoured at ontract prices under Government expert supervision. A greater quantity of

wool than in previous years is now scoured in the Dominion to save shipping space and freight, and practically every wool-scourer is engaged on Government work. The scoured wool, after being passed by the Inspectors, is revalued for Imperial purposes and delivered to shipping stores for dumping and shipment.

[Sheep-skins and hides will be dealt with in the next issue of the *Journal*.]

MANUFACTURE AND BRANDING OF WHEY BUTTER.

THE following additional regulations under the Dairy Industry Act, concerning the manufacture and branding of whey butter, were issued in the *Gazette* of 22nd November, 1917, and came into force on the same date. They now form part of and are to be read together with the general body of regulations under the Act, gazetted on 18th September, 1899:—

1. For the purpose of supplying to the Minister such statistics and information relating to such dairy as the Minister may request, every owner of a dairy shall keep an accurate record of the number of pounds of (*a*) milk-fat separated or recovered from whey; (*b*) milk-fat purchased in the form of whey cream; (*c*) whey butter manufactured from such milk-fat separated or recovered from whey; and (*d*) milk-fat separated from milk, if any, which may have been added to prepare such whey butter.

2. If any owner of a dairy mixes cream or milk-fat recovered from whey with cream or milk-fat separated from milk, for the purpose of manufacturing butter therewith, the resulting product shall be branded "whey butter."

3. All packages containing whey butter shall be branded "whey butter" in the manner herein provided—(*a*) In the case of whey butter packed in bulk, by having the aforesaid words clearly and indelibly impressed on the outside of the package; and (*b*) in the case of whey butter put into pats or prints, by having the aforesaid words printed on a white ground in black letters of a size not less than one-half of an inch in length: Provided that in each case the brand to be used shall first be approved by the Department of Agriculture.

4. Every person who commits any breach of these regulations is liable to a fine not exceeding £50.

FORTHCOMING AGRICULTURAL SHOWS.

Nuhaka A. and P. Association: At Nuhaka, 1st January.
Wairoa County A. and P. Society: At Wairoa, 16th January.
Helensville A. and P. Association: At Helensville, 29th January.
Woodville A. and P. Association: At Woodville, 30th January.
Feilding A. and P. Association: At Feilding, 5th and 6th February.
Central A. and P. Association: At Waipukurau, 6th February.
Pahiatua A. and P. Association: At Pahiatua, 8th February.
Dannevirke A. and P. Association: At Dannevirke, 13th and 14th February.
Taumarunui A. and P. Association: At Taumarunui, 13th February.
Masterton A. and P. Association: At Solway, 19th and 20th February.
Waimarino A.P.H. and I. Association: At Raetihi, 21st February.
Taranaki A. and P. Association: At New Plymouth, 27th and 28th February.
Whakatane A. and P. Association: At Taneatua, 27th February.
Hawke's Bay A. and P. Society: Autumn Show at Hastings, 5th and 6th March.
Opotiki A. and P. Association: At Opotiki, 7th March.
Rotorua A. and P. Association: At Rotorua, 13th March.
Ashburton A. and P. Association: At Ashburton, 14th March.
Temuka and Geraldine A. and P. Association: At Temuka, 14th March.
Matamata A. and P. Association: At Matamata, 21st March.
Oxford A. and P. Association: At Oxford 4th April.
Methven A. and P. Association: At Methven, 11th April.

(A. & P. Association secretaries are invited to supply particulars of their show dates.)